Ultrasonography of the uterus and ovaries

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Abstract

Ultrasonography is the most frequently used imaging investigation in the assessment of the female genital tract. Most often the uterus and ovaries are evaluated with the help 2D transabdominal or endovaginal ultrasonography.

The interpretation of the ultrasonographic data in order to establish the diagnosis of the main uterine and ovarian pathologies requires information about the examination technique and proper knowledge of the female genital tract ultrasonography anat-

Key words: ultrasonography, uterus, ovary.

Rezumat

Ultrasonografia este modalitatea de examinare imagistică cel mai des utilizată pentru explorarea aparatului genital feminin. Câl mai frecvent uterul şi ovarele sunt apreciate prin ecografie 2 D realizată pe cale transabdominală sau endovaginală.

Interpretarea datelor furnizate de examinarea ecografică în stabilirea diagnosticului principalelor afecţiuni uterine sau ovariene necesită informaţii privind tehnica de examinare precum şi aprofundarea unor aspecte de ecoanatomie a sferei genitale feminine.

Cuvinte cheie: ultrasonografie, uter, ovar.

Ultrasonography is a noninvasive method of investigation of the uterus and ovaries.

The ultrasound examination may be performed in different stages of a woman’s life, the main ones being those when she presents a menstrual cycle and the menopause. Uterine ultrasound allows the physician to establish a diagnosis in the following conditions: malformations, benign or malignant tumors, or intracavitary retentions. The main ovarian diseases that highly benefit from the use of ultrasonography for their diagnosis are: functional ovarian cysts, benign and malignant tumors, and tubo-ovarian abscesses. Ultrasonography also helps in the evaluation of the ovarian ovulatory function, along the other investigations recommended for infertility.

The interpretation of the ultrasonographic findings requires knowledge of the uterine and ovarian ultrasound anatomy.

Examination technique

The ultrasound exam of the uterus and ovaries may be performed either with a transabdominal 3.5 MHz transducer, either with a transvaginal 6.5-7.5 MHz transducer.

There are various types of examinations that may be realized: standard gray scale, three-dimensional, or Doppler ultrasonography.

Transabdominal ultrasonography is performed with the patient in dorsal decubitus and with a full urinary bladder. The lateral decubitus allows sometimes for a better visualization of the ovaries and parauterine or retrouterine masses. Endovaginal ultrasonography is better realized on the gynecological table, for an easier manipulation of the transducer, and with an empty bladder.
Systematic sagittal and transverse images are obtained. These two types of views allow for a three-dimensional integration of the pelvic anatomy and are usually enough for establishing the diagnosis. Sometimes frontal views are necessary in order to explore the uterus.

**Ultrasound anatomy**

**The uterus**

The uterus represents the essential landmark of pelvic anatomy. The main aspects that can be evaluated through ultrasonography are:

*The position.* Usually the uterus has a mid-central situation within the pelvis. A lateral position is seldom encountered and it is realized around the axis of the uterine isthmus. The anteverted-anteflexed uterus, with the uterine body found in the vesico-uterine space, is the most frequent situation compared with the retroverted-retroflexed uterus, when the uterine body is situated in the Douglas pouch (fig 1).

*The size.* The following measurements are obtained during the ultrasound evaluation of the uterus: the length – the distance from the fundus to the internal orifice of the uterus on a sagittal view; the width – the maximum anterior-posterior distance measured in the mid portion of the uterine body also on a sagittal view; the thickness – the maximum distance measured at the level of the uterine fundus on a transverse view. The mean uterine measurements of a reproductive age patient are 70/35/50 mm, while the measurements for menopausal patient are 50/20/25 (fig 2, fig 3).

*The shape.* On a sagittal plane the uterus has a pyriform shape: the superior two thirds correspond to the uterine body and the inferior third to the cervix. The uterine isthmus is identified where the uterine body and cervix meet.

On the transverse view the uterine body has an oval shape, with a transverse long axis, while the isthmus and the cervix have a round shape.

**Fig 1.** Endovaginal ultrasonography – normal appearance of the uterus.

**Fig 2.** Transabdominal ultrasonography – uterus – normal aspect, anteverted-anteflexed. Uterine measurements on a sagittal view (length, width).

**Fig 3.** Transabdominal ultrasonography – evaluation of uterine thickness in a transverse view.

**Fig 4.** Endovaginal ultrasonography – uterine cavity line.
Uterine ultrasonographic structure. The myometrium has a homogeneous structure, with fine, parallel, linear echoes and an echogenicity similar to a muscle. The hyperechoic area in the middle is the uterine cavity and cannot be measured (fig 4). The cavity line corresponds to the virtual interface that separates the layers of the endometrium. The endometrium is evaluated on a sagittal view. When the cavity line is present the endometrium is measured from the base of its anterior layer to the base of its posterior layer (double layer). When there is intracavitary retention only one layer of the endometrium is measured (single layer thickness) (fig 5, fig 6). The thickness and the echogenicity of the endometrium varies with the different stages of the menstrual cycle.

The Ovaries

The main characteristics of the ovary that can be assessed especially through endovaginal ultrasound are:

The position. Usually the ovaries are found lateral from the uterus in the ovarian fossa, behind and inside the external iliac vessels. Sometimes the ovaries are asymmetrical and mobile and change their position as the uterus changes its own position with the degree of urinary bladder repletion.

The shape. The ovary has an oval shape with the long axis oriented downward and forward. The ovaries have a fine contour.

The size. The measurements of the ovary are obtained after determining its long axis. Two distances (the length and the width) are measured in this view and a third one (the thickness) is obtained after rotating the transducers with 90°. The mean measurements of the ovary are 30/15/15 mm, and the volume is 1.8-5.7 cm³ (fig 7).

Ovarian ultrasonographic structure. The overall aspect of the ovary is hypoechoic when compared with the myometrium. Through endovaginal ultrasound two distinct areas can be observed (fig 8):

- an echoic central area (corresponding to the stroma)
- a peripheral area (corresponding to the cortex) which contains the ovarian follicles in different development stages. The dynamics of ovarian structure may be
Ultrasonography of the uterus and ovaries evaluated during the spontaneous ovarian cycle or after stimulation as part of infertility investigation.

Conclusion

The ultrasonographic exam of the uterus and ovaries does not present any difficulties.

Proper knowledge regarding the examination technique as well as the ultrasound uterine and ovarian anatomy is absolutely necessary for the integration of ultrasonographic data in order to establish the diagnosis of the most frequently encountered gynecological conditions.

References


