

Voluson P8

OB/GYN Transvaginal Ultrasonography Case Reports Using Harmonic Imaging and HD-Flow

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Compact-like equipment with high image quality. The small footprint, lightweight probe is very easy to use and recommended.



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Transvaginal ultrasound diagnosis (transvaginal ultrasonography) has already become an indispensable tool for obstetrics and gynecology practice, but this new transvaginal ultrasound diagnostic equipment Voluson™ P8¹, while being compact, has realized unprecedented high image quality. This equipment has a number of features to help improve the everyday medical practice even further.

Voluson P8 is provided with a combination of high resolution and high penetration in the images of harmonic imaging with regards to the B mode, the basis of ultrasound diagnosis, making it possible to obtain clear images even of large myoma, which had been considered a weakness of transvaginal ultrasonography.

In addition, transvaginal ultrasonography has a color Doppler function used less frequently thus far, and in particular, the HD-Flow™ function² can go as far as to display fine blood flow in high-definition, adding a new perspective to diagnostic imaging in the field of gynecology.

Furthermore, 3D/4D function (HDlive³ etc.) cultivated in the Voluson premium machine, E series, is also installed, which will be useful in sonohysterography in the field of gynecology and fetus image display in early pregnancy.

In view of the above, Voluson P8 can be considered the most suitable equipment for everyday medical practice of all obstetricians and gynecologists.



Key points of the screening scan of transvaginal ultrasonography:

- Pelvic examination should be done before performing transvaginal ultrasonography to obtain information in advance on the position and size of internal genitalia and presence or absence of structural abnormalities
- With regards to the transvaginal ultrasound probe for examination in the field of gynecology, the basis is to insert the probe in a position pressing uterine cervix through the anterior fornix of the vagina in the case of the anteverted uterus and through the posterior fornix of the vagina in the case of the retroverted uterus
- In the observation of the uterus, first, with the positions where the longitudinal sections of the cervix and the endometrium are collinear as the basis, next the probe in this location can be moved slightly to the left and right or rotated to detect the presence or absence of abnormal findings
- The ovaries should be visualized with follicles as a guide in the vicinity of the left and right external iliac artery and vein. In postmenopausal women, the ovaries are atrophied and small, and follicles as a guide cannot be recognized. Therefore, it can be considered that not being depicted is normal
- Regarding the use of color Doppler, adjustment should be made according to the size of targeted blood vessels and the velocity of blood flow
- For 3D/4D scanning, first, after confirming that the entire image of the target is shown and the size and shape of the region of interest is adjusted and then rotate in the X, Y, Z axial directions

The clinical benefit brought by high image quality

Transvaginal ultrasonography, similar to pelvic examination, is a routine examination performed by obstetricians and gynecologists for almost all patients. In this kind of examination, obtaining a high quality image not only leads to accurate diagnosis but also to reduction of examination time. Furthermore, various findings that thus far could not be viewed can be obtained, making the examination itself very interesting.

Clinical usefulness of blood flow display (color Doppler/HD-Flow)

With regards to conventional transvaginal ultrasound probes, the color Doppler method had not been often performed since the mechanical scanning probe tended to be widely used. However, the development and practical application of a compact, lightweight, and high image quality microconvex probe have made it possible to perform the color Doppler method even for transvaginal ultrasonic diagnostic equipment. As a result, various kinds of information leading to pathophysiology of diseases, which could not be obtained only with B-mode images, can now be obtained and thus is useful for accuracy improvement of routine ultrasonic diagnosis. Especially, HD-Flow has high sensitivity and can go as far as to display fine blood flow in high-definition.

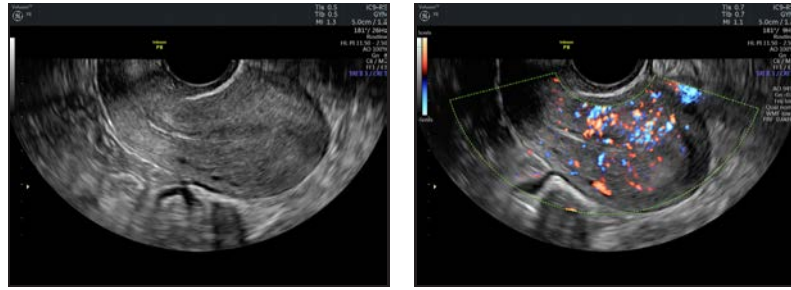
IC9-RS probe



1. Voluson P8 BT16 is used.
2. HD-Flow is an advanced blood flow display method that is superior in sensitivity and resolution and can display direction.
3. HDlive is a rendering technology that expresses realistic surface images as if they are accurately reproduced.

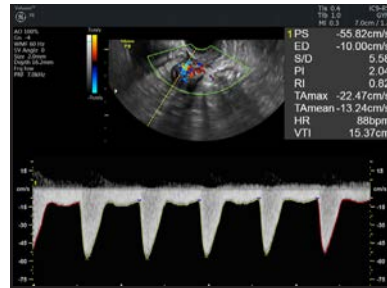
Normal uterus, Proliferative phase

In the uterus immediately after menstruation, the endometrium is slightly of high signal intensity but appears thin, and the boundary with the myometrium is also unclear. In HD-Flow, the radial artery penetrating the myometrium is clearly visualized.



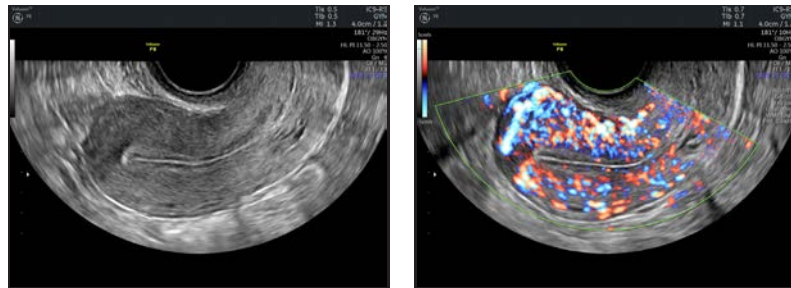
Uterine artery blood flow, Proliferative phase

This is the blood flow waveform of the uterine artery in the proliferative phase. The PI value is as high as 2.04 and the characteristic finding termed notch, is observed in the early diastole phase following the peak systole.



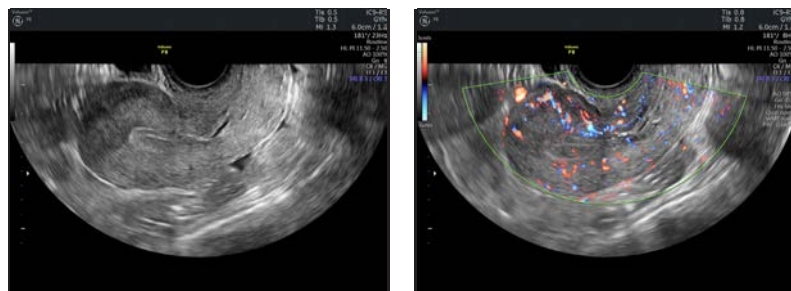
Normal uterus, Late proliferative phase

From the findings of the endometrium, this case seems to be a period of time approaching the ovulation phase. The endometrium of this period is still thin, but endometrial echogram shows low signal intensity in the site near the uterine lumen. The blood flow of the myometrium is clearly visualized by HD-Flow that penetrates the muscle layer from the arcuate artery, and the radial artery which reaches directly beneath the endometrium.



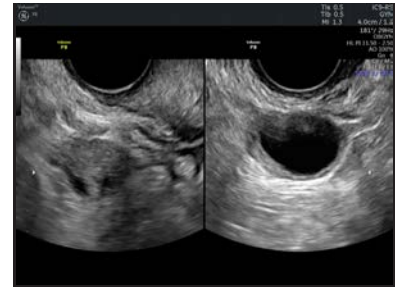
Normal uterus, Ovulation phase

While the endometrium in the ovulation phase shows high signal intensity at the boundary between the uterine lumen and the myometrium, the substantial part of the endometrium is of low signal intensity, having a shape that has been referred to as "lip-shaped" or "leaf-shaped." Moreover, since the amount of mucus secretion from the cervical canal increases, the cervical canal lumen may sometimes appear echo-free.



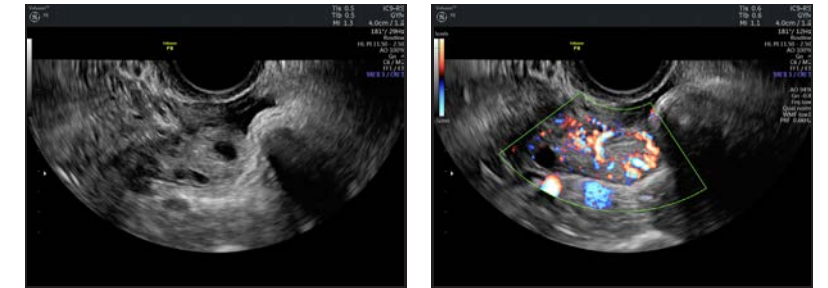
Growing follicles

The right and left ovaries are visualized with two screens. The right side of the monitor is the growing follicles immediately before ovulation, and multiple small follicles are observed in the left ovary.



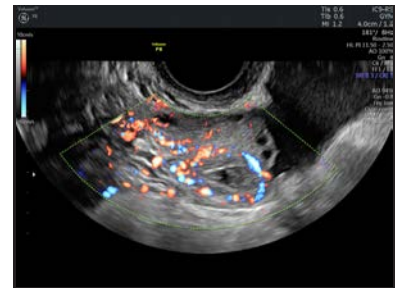
Corpus luteum of menstruation

The corpus luteum is visualized as a relatively thick-walled, small cyst image. The characteristic of the corpus luteum is that abundant blood flow, as surrounding this cyst, is observed.



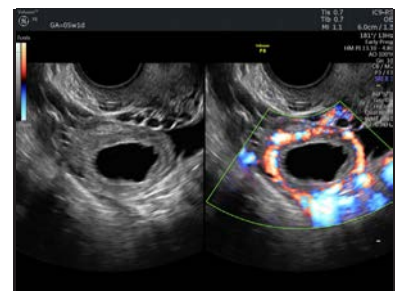
Corpus luteum of menstruation

Similarly, this is the corpus luteum observed in the ovary immediately after ovulation. Abundant blood flow is seen as surrounding the corpus luteum.



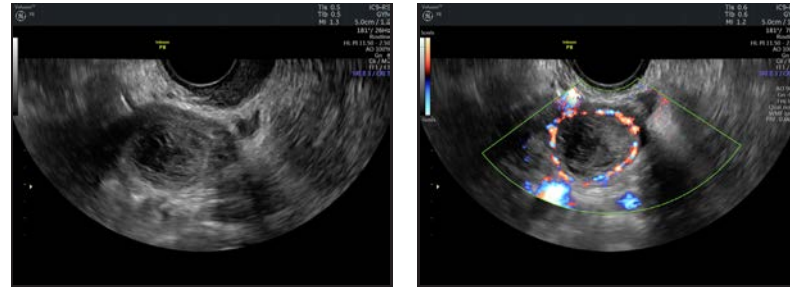
Corpus luteum of pregnancy

In the early pregnancy, a cyst image may be seen in the ovary on one side, and that the border is relatively thick and the abundant blood flow is observed in the surrounding area characteristic finding of the corpus luteum of pregnancy. B-mode image on the left side and HD-Flow on the right side are simultaneously shown.



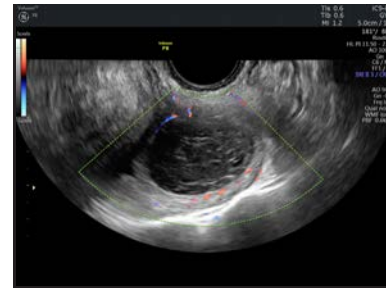
Corpus luteum hematoma

In the ovary after ovulation, a mass with a diameter of about 4 cm with heterogeneous internal echo, as seen in the echograms, may be observed. In the case of corpus luteum hematoma, the characteristic blood flow surrounding the mass is observed by the HD-Flow.



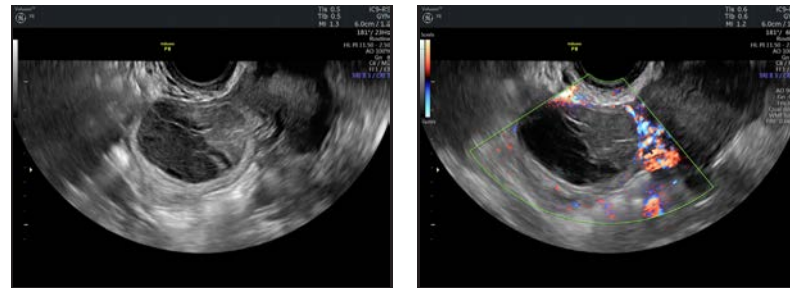
Corpus luteum hematoma

In corpus luteum hematoma, the cystic component is often found in a “reticular pattern.”



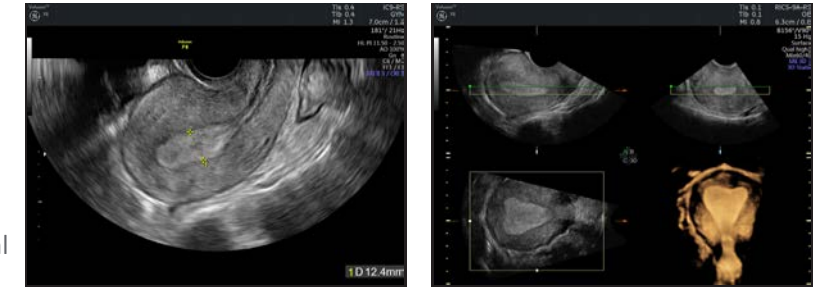
Corpus luteum hematoma

In corpus luteum, since the internal echo of the ovarian mass derives from the blood clot, a characteristic morphological change occurs each time observation is made.



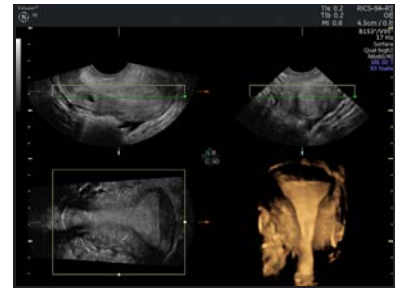
Normal uterus, Secretory phase

The endometrium is thickened in the secretory phase, characterized by showing a solid mass of high signal intensity, which is thought to be derived from the structure of the endometrial glands dilated and traveling tortuously in the endometrium. When the uterus is scanned in 3D and rendered in three orthogonal planes, the frontal plane of the uterus, which is difficult to be depicted with the general transvaginal ultrasound, can be observed. At this time, in the secretory phase, in which the endometrium is thick and visualized with high signal intensity, the morphological abnormality of the uterine lumen can be diagnosed from the shape of the endometrium.



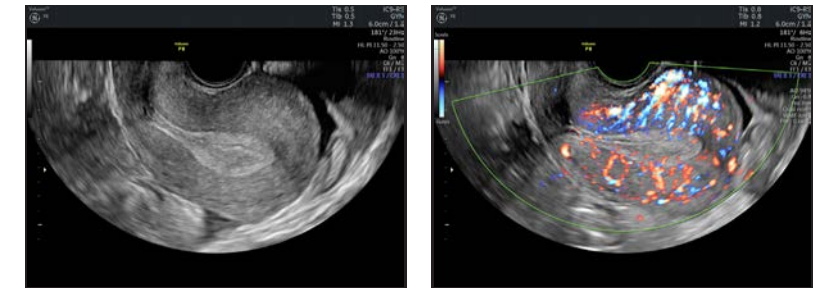
Normal uterus

In another case, the shape of the uterine lumen is clearly visualized.



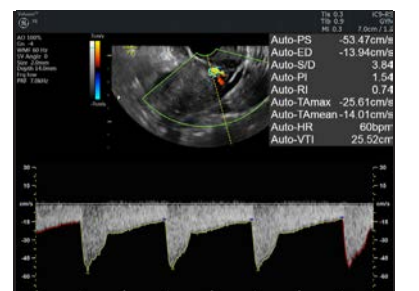
Normal uterus, Secretory phase

This is an endometrial image of the secretory phase. In this case, the radial artery which penetrates the myometrium vertically toward the endometrium is clearly visualized.



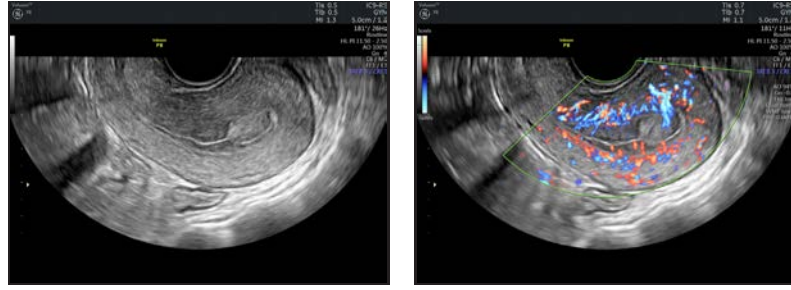
Uterine artery blood flow, Secretory phase

The blood flow waveform of the uterine artery in the secretory phase does not differ much from the waveform in the proliferative phase, but in this case, the PI value is slightly lower (PI = 1.54 in this example), and the notch in the early diastole phase following the systole phase is no longer observed.



Endometrial polyp

The endometrial image of the late proliferative phase; a mass of high signal intensity is observed in the uterine lumen. It can be diagnosed as endometrial polyp since it has not reached the muscle layer. The blood flow penetrating the endometrium and reaching inside the polyp is clearly visualized with HD-Flow.



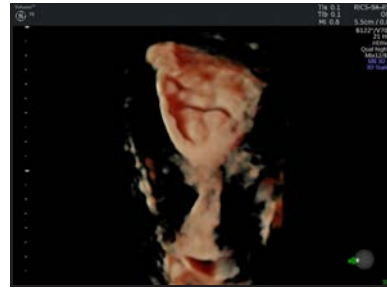
Sonohysterography

This echogram shows the findings when sonohysterography was performed on a case of suspected endometrial polyp. The feeding tube inserted through the cervix and the uterine lumen dilated by the injection of physiological saline are visualized. The echo-free space of the pouch of Douglas is the result of the retrograde efflux of the injected physiological saline from the fallopian tube.



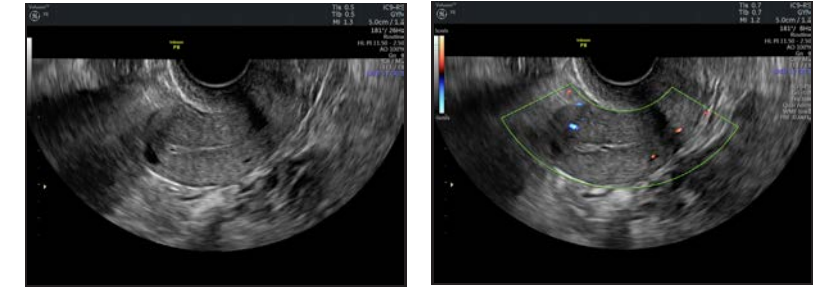
Sonohysterography HDlive 3D image

This echogram shows the findings when the uterine lumen was 3D scanned during sonohysterography showing the surface display of the posterior wall of the uterine lumen with HDlive. By changing the irradiation direction of the virtual light source, the level difference is shown in the endometrium.



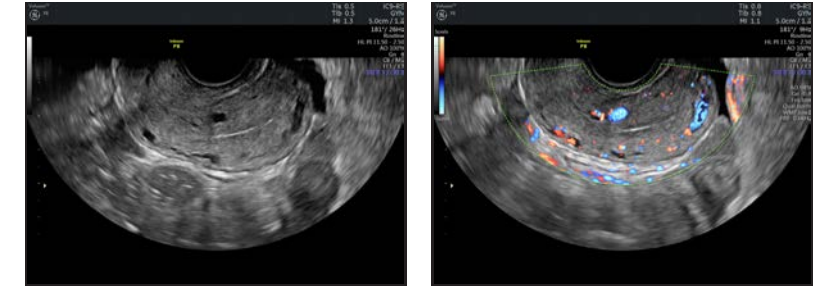
Normal uterus, Post menopause

Findings of a atrophied and small postmenopausal uterus; the endometrium is atrophied and thin, and partially echo-free.



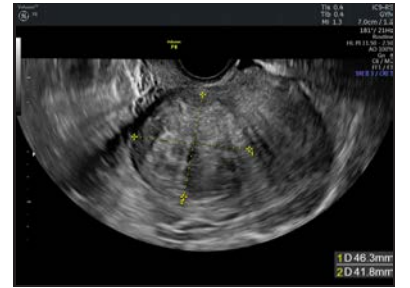
Normal uterus, Post menopause

Similarly, findings of a atrophied and small postmenopausal uterus; the endometrium is atrophied and observed as thin linear. The echo-free space found in the muscle layer shows that it is a blood vessel (arcuate artery) findings from the existence of the blood flow.



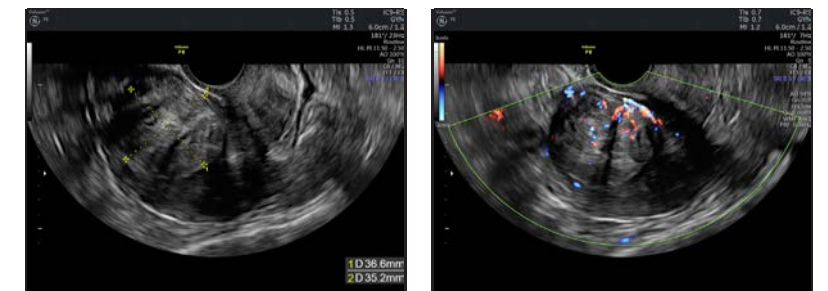
Uterine fibroids

Diagnosis of interstitial fibroids can be made from the relatively well-defined round mass in the myometrium.



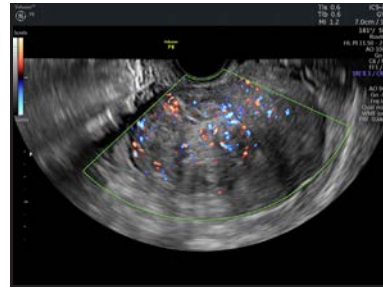
Uterine fibroids

Uterine fibroids are visualized as the well-defined mass of slightly low signal intensity. In HD-Flow, the characteristic blood flow surrounding the uterine fibroid nodules is observed.



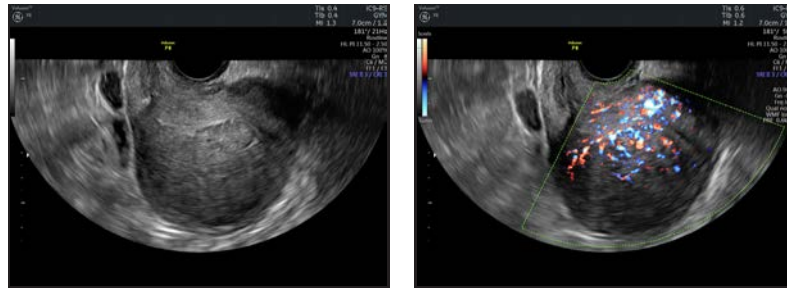
Uterine fibroids

HD-Flow clearly shows the characteristic blood flow in the uterine fibroids that surround the intramuscular mass.



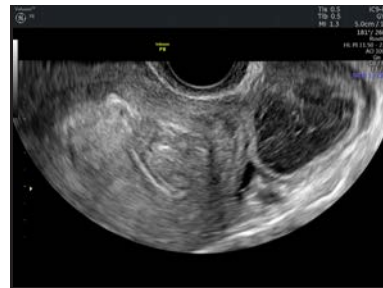
Uterine fibroids

In B-mode image, the case requires the differential diagnosis of either uterine fibroids or endometriosis from the findings of the anterior wall of the thickened uterus body of the retroflexed uterus. In HD-Flow, however, the blood flow surrounding the thickened region of the muscle layer of the anterior wall is clearly visualized, making a diagnosis of uterine fibroids possible.



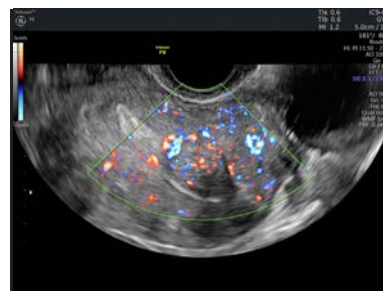
Submucosal fibroids + corpus luteum hematoma

A relatively well-defined mass is found directly beneath the lining of the uterus, and since the endometrial image is deformed, submucosal fibroids can be suspected. The mass on the right side of the echogram is a corpus luteum image.



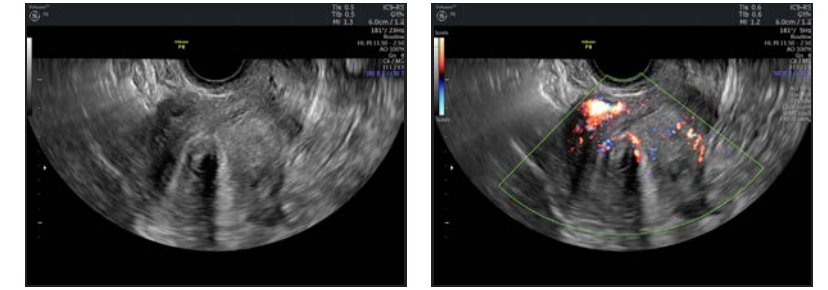
Submucosal fibroids

HD-Flow findings of the same case; a diagnosis of submucosal fibroids can be made judging from the existence of the blood flow that surrounds the mass directly beneath the endometrium.



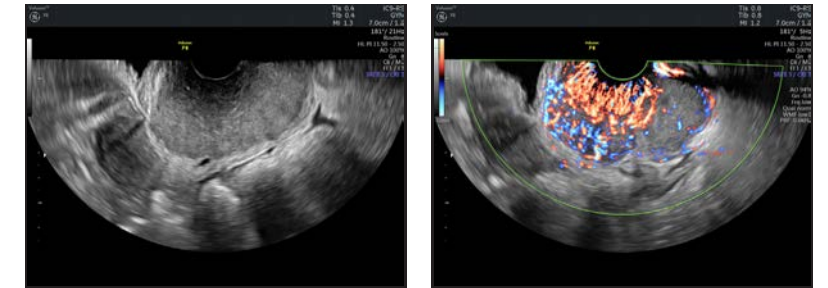
Submucosal fibroids

Another case of submucosal fibroids directly beneath the lining of the uterus; submucosal fibroids are suspected since the blood flow surrounding the fibroids is observed.



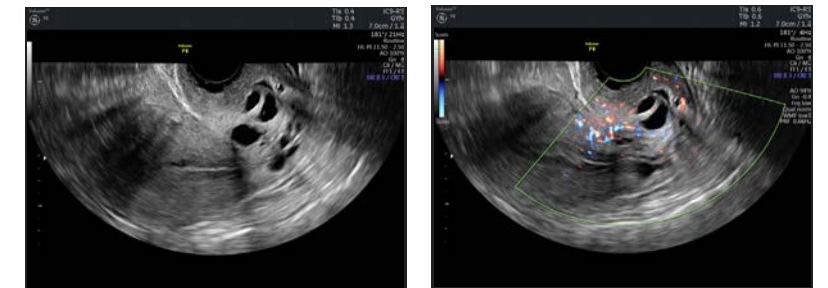
Cervical cancer, Stage IIb

A relatively well-defined huge mass is observed in the cervix. Stage IIb cervical cancer was diagnosed based on pelvic examination findings and histologic diagnosis. The cervical mass reveals that there is abundant blood flow from the center to the periphery.



Lobular endocervical glandular hyperplasia (LEGH)

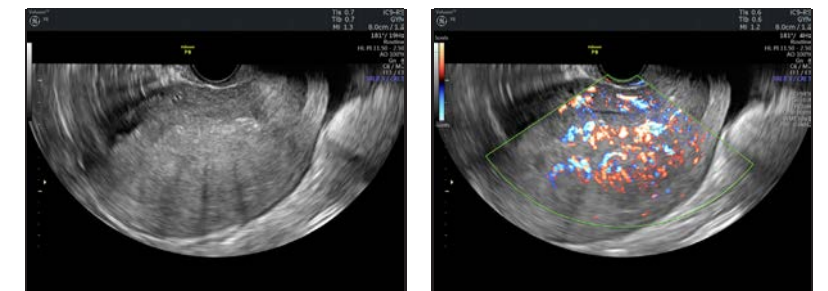
The dilated cervical glands are observed over the entire circumference of the cervix. Not much blood flow is seen since these are benign lesions.



Endometrial cancer

This is a case of endometrial cancer. Though after menopause, the uterus is enlarged, the uterine lumen is filled with a mass of high signal intensity partly with an acoustic shadow, and the boundary between the mass and the myometrium is unclear. Thus, muscle invasion is suspected.

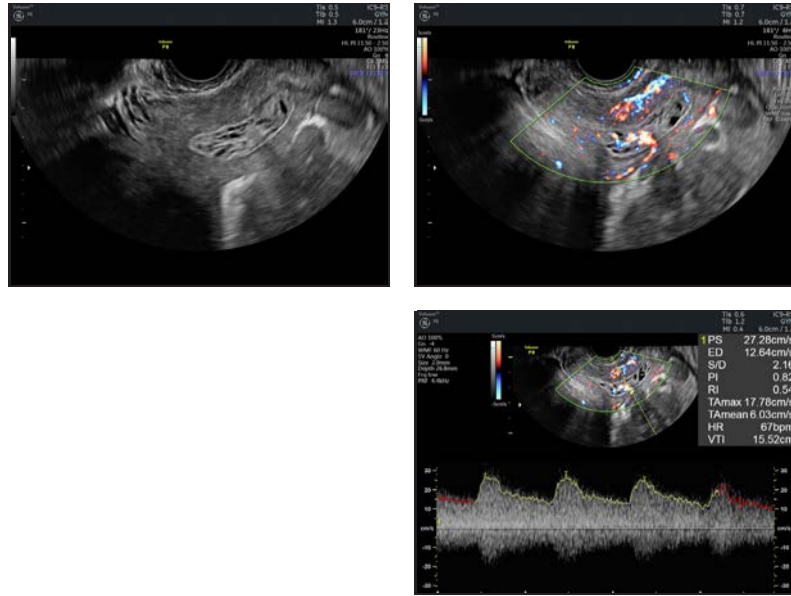
Abundant blood flow is observed in HD-Flow with regards to the mass filled inside the uterus.



Endometrial cancer (associated with theca cell tumors)

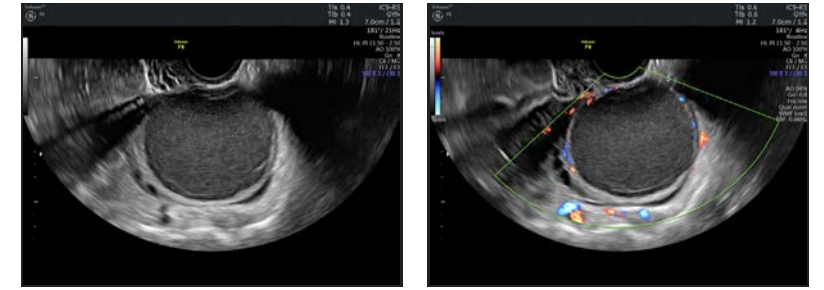
Endometrial findings of the case of solid ovarian tumors (theca cell tumors); though this case is post-menopausal, the endometrium is heavily thickened, indicating the effect of estrogen produced from the ovarian tumors.

Although the boundary between the endometrium and the muscle layer is clear, an arterial blood flow signal with low impedance of $RI = 0.54$ is observed in the endometrium. Histopathological findings after evisceration revealed stage IA endometrioid adenocarcinoma.



Endometriotic cyst (chocolate cyst)

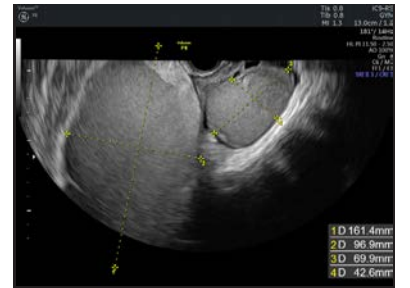
The cyst wall is relatively thick with the “ground glass” cyst component, indicating the echo pattern classification type II. Other than the mild blood flow seen in the cyst wall, particularly noticeable blood flow signals are not observed.



Bilateral ovarian chocolate cyst

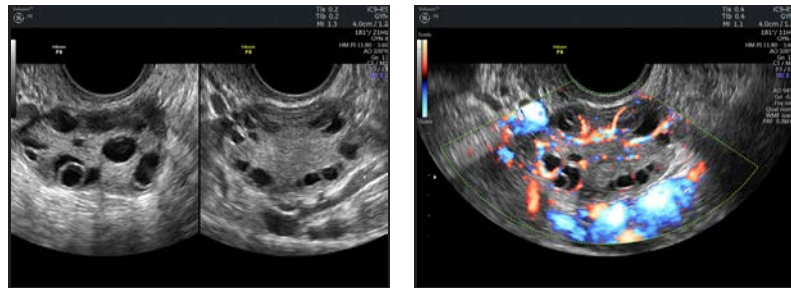
Echograms of endometriotic cysts found bilaterally, both showing the echo pattern classification type II.

One is a large cyst exceeding 10 cm, but is relatively clearly visualized to the depth.



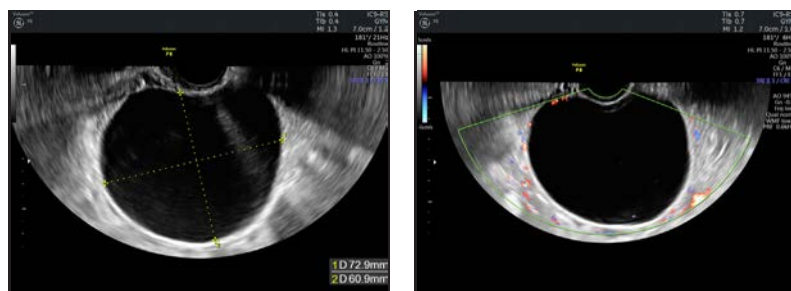
Polycystic ovary syndrome (PCOS)

Small follicles are aligned “pearl necklace-like” directly under the bilateral ovarian capsules and the parenchyma is of slightly high signal intensity, indicating the characteristic of the echogram of polycystic ovary.



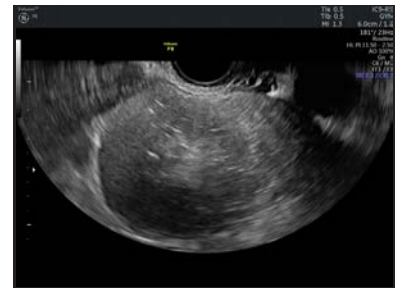
Simple cyst

Echograms of ovarian cyst (serous cyst adenoma); the internal echo of the cyst is echo-free, indicating the echo pattern classification type I of the ovarian mass by the Japan Society of Ultrasonics in Medicine. However, since it was 7 cm in diameter and relatively large, surgery (laparoscopic ovarian cystectomy) was performed.



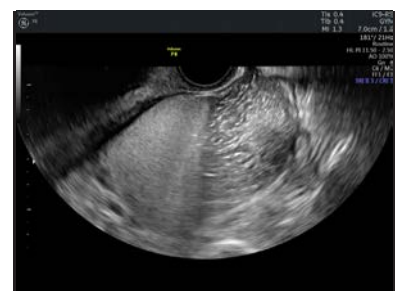
Dermoid cyst

An echogram of dermoid cyst; the existence of a solid part inside with an acoustic shadow (echo pattern classification type III) shown remotely from the cyst wall which is considered to be derived from hair as well as a short linear echo of high signal intensity scattered in the cyst are observed.



Dermoid cyst

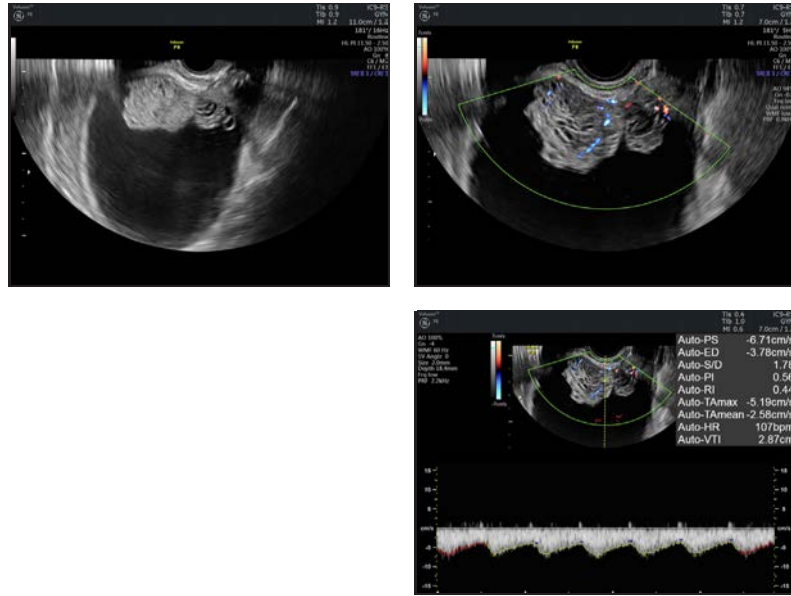
The presence of the fluid level and a short linear echo of high signal intensity scattered in the cyst are a typical echogram seen in dermoid cysts.



Ovarian cancer, Clear cell adenocarcinoma

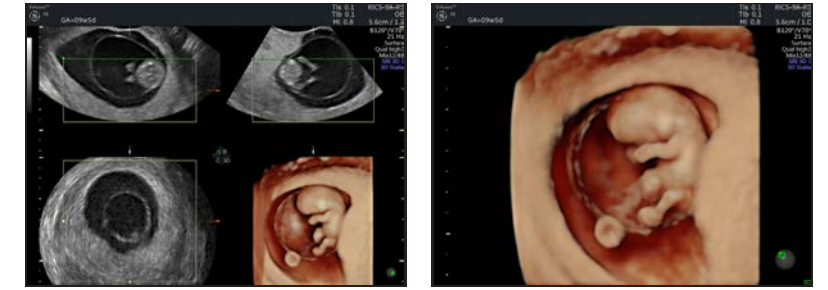
Among the mixed echo patterns, this case with an existence of a solid part showing mural surface irregularities and classified as an echo pattern IV type is a finding suggesting ovarian cancer.

Arterial blood flow is detected in a solid part. Since many arteriovenous shunts exist in new blood vessels in malignant tumor, the arterial waveform inside the solid part indicates low impedance (RI = 0.44). In HD-Flow, even thin blood flow with a slow flow rate can be clearly visualized, and furthermore, the Doppler waveform can be clearly detected.



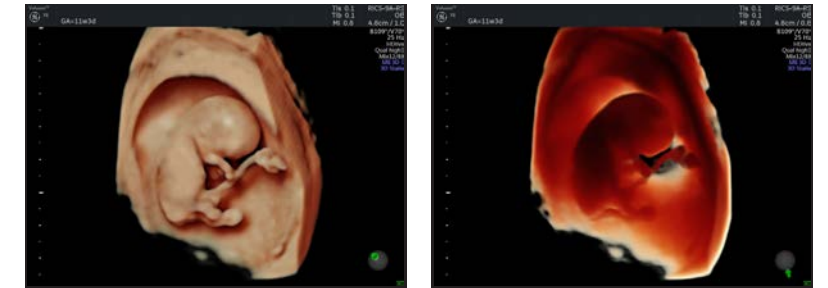
Fetus of 9 weeks gestation, HDlive 3D image

The 3D images by HDlive of the fetus of 9 weeks gestation; in the early stage of pregnancy, 3D images of the systemic findings of the fetus can be visualized comparatively easily because of the distributed existence of the echo-free space around the fetus, less frequent fetal movements, and the ability to scan the entire fetal sac.



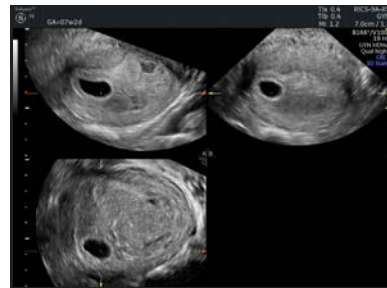
Fetus of 11 weeks gestation, HDlive 3D image

The 3D images by HDlive of the fetus of 11 weeks gestation; the expressive power is improved by changing the irradiation direction of the virtual light source. The virtual light source is irradiated from the front upper left part in the left image and from the rear lower right part in the right image.



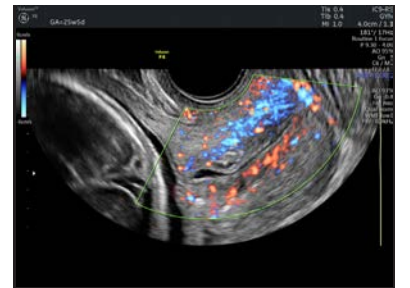
Confirmation of pregnancy site

Finding of the GS (gestational sac) image in the uterus in the first trimester of pregnancy; three orthogonal planes display GS in the bottom right cornual part of the endometrium.



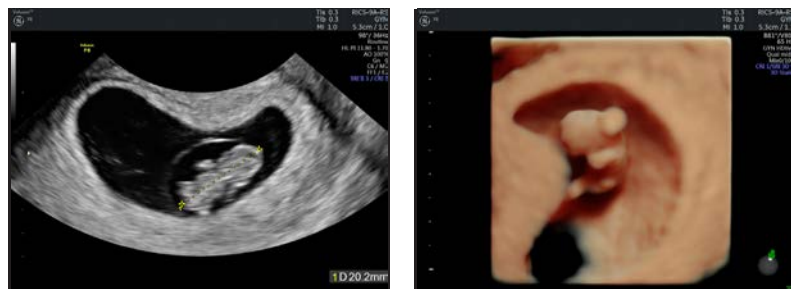
Cervix

Finding of the cervix in the second trimester of pregnancy; the lower uterine segment is still closed and the cervical length is maintaining sufficient length. The blood flow from the surrounding cervix to the cervical canal is clearly visualized by HD-Flow.



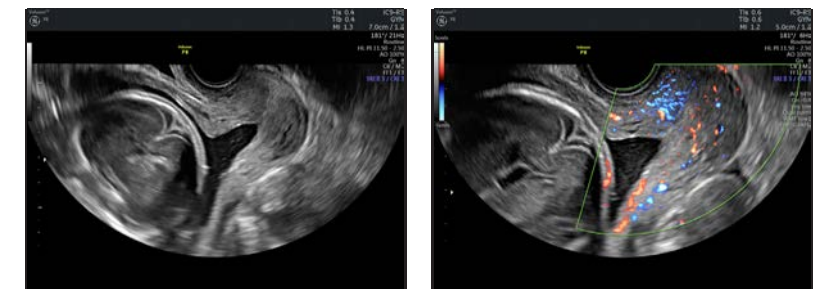
Fetus of 8 weeks gestation, HDlive 3D image

The frontal plane of the fetus of 8 weeks gestation and 3D display by HDlive; in 3D, the yolk sac in front of the neck of the fetus is also shown at the same time.



Funneling

Cervical images of a case of threatened premature labor in the second trimester of pregnancy. Cervical shortening is observed by the presence of funneling.



The description is based on the experience of the user, which GE Healthcare Japan Corporation does not guarantee as a specification value.

Manufacture and sales

GE Healthcare Japan Corporation

General-purpose ultrasonic diagnostic imaging device Voluson P8

Medical device approval number 224ABBZX00143000

Sales name IC9-RS Probe

Medical device approval number 226ABBZX00154000

Sales name RIC5-9A-RS Probe

Medical device approval number 227ABBZX00098000

Imagination at work

Product may not be available in all countries and regions.

Full product technical specification is available upon request. Contact a GE Healthcare Representative for more information. Please visit

www.gehealthcare.com/promotional-locations.

Data subject to change.

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