

# Volume Ultrasound facilitates evaluation of the infertility patient

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## Introduction

The role of conventional ultrasound in the evaluation of gynecologic abnormalities is well established. Two-dimensional ultrasonography (2DUS) using several scan planes allows the ultrasound user to develop a mental picture of the structures in three dimensions. Pelvic anatomy, however, can preclude obtaining images in certain planes and limit the ability of the clinician to understand the pathology. Volume Ultrasound overcomes this limitation by acquiring volumetric information, which can then be constructed and manipulated in any plane adding vital information to the work-up of the patient.

The following case sheds light on the clinical value of Volume Ultrasound and how it can give physicians a “global picture” of pelvic anatomy, which would have been difficult to understand with 2D imaging alone.

## Clinical history

A 26-year-old female patient with a history of infertility and recent loss of a 14-week pregnancy presented for sonographic evaluation of the pelvis.

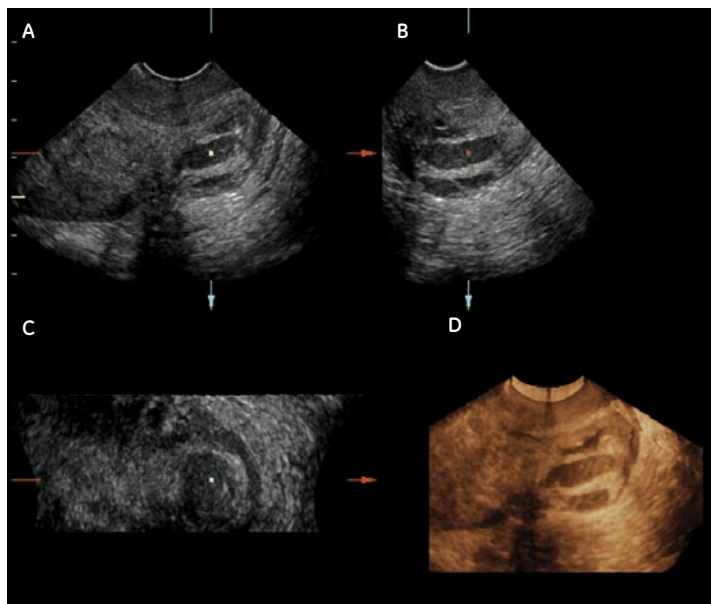
2D endovaginal ultrasound of the cervix showed several hypoechoic avascular circumscribed masses with imaging characteristics consistent with endometriomas in the cervix (Figures 1A and 1B). The 2DUS could not fully depict the extent of the cervical endometriosis, nor allow complete analysis of the relationship of the masses to the endocervical canal. The patient was then scanned with the 4DE7C volume transducer on the LOGIQ® 9 ultrasound system (GE Healthcare, Milwaukee, WI). Using Volume Ultrasound, a coronal view and 3D volume renderings of transverse, longitudinal and coronal images were constructed (Figures 1C, 1D, 2, and 3). Such renderings demonstrate that the masses involved the full cervical length, with greater than 50% involvement in the transverse and coronal planes.

Colposcopic examination of the cervix was normal, even with knowledge of the cervical masses seen with ultrasound. The cervical endometriosis was unsuspected clinically. Volume Ultrasound was able to provide a plausible explanation for the patient’s pregnancy loss. For this patient battling infertility, the presence of extensive cervical endometriosis was important. If cerclage is contemplated, Volume Ultrasound can guide the obstetrician in optimal placement of the cerclage.

## Discussion

2DUS evaluation of the cervix is limited, due to restricted range of mobility of the vaginal transducer. The cervix cannot be evaluated in the coronal plane with conventional techniques in 2DUS. Multi-planar interrogation allows coronal display of the cervix and gives invaluable volumetric information. Multi-planar 3D reconstruction is also available post-acquisition via raw data storage. This may be valuable if an abnormality is observed after the patient has left the department and further evaluation is deemed necessary.

Endometriosis, the presence of functional endometrium outside of the uterus, is a common condition in premenopausal women. Patients often present with pelvic pain, dyspareunia and/or infertility. Cervical endometriosis is rarely diagnosed with conventional ultrasound imaging. The position of the endometriomas in the cervix and consequent distortion of the cervix can lead to cervical incompetence. With Volume Ultrasound imaging, the cervix can be thoroughly investigated for the presence of endometriomas or other structural abnormalities that could predispose patients for cervical incompetence and pregnancy loss. This valuable tool should be routinely used in patients after pregnancy loss due to cervical incompetence.



**Figure 1**

- A** (Upper Left) 2DUS longitudinal image of the cervix showing the relationship of the cervix to the uterus and the length of cervical involvement.
- B** (Upper Right) 2DUS transverse image.
- C** (Lower Left) 3DUS coronal image showing longitudinal and transverse involvement.
- D** (Lower Right) Longitudinal 3D volume image demonstrates the close proximity of the endometriomas to the endocervical canal better than the 2D image.

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**Figure 2**

Transverse 3D volume image gives detail of the relationship of the endometriomas to the endocervical canal.



**Figure 3**

Rendering of the coronal plane of the cervix, a view not possible with 2DUS.

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