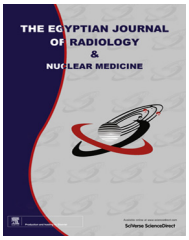
The Egyptian Journal of Radiology and Nuclear Medicine (2014) **45**, 555–560

Egyptian Society of Radiology and Nuclear Medicine

The Egyptian Journal of Radiology and Nuclear Medicine

www.elsevier.com/locate/ejrnm
www.sciencedirect.com



ORIGINAL ARTICLE

Role of three-dimensional ultrasound in the diagnosis of double uterine cavity anomalies and concordance with laparoscopic and hysteroscopic diagnosis

Ahmed M. El Huseiny [a], Reda A. Ahmad [a], Somayya M. Sadek [a], Ghada K. Gouhar [b,*], Haitham A. Dawood [b]

[a] *Obstetrics and Gynaecology Department, Faculty of Medicine, Zagazig University, Egypt*
[b] *Radiodiagnosis Department, Faculty of Medicine, Zagazig University, Egypt*

Received 19 December 2013; accepted 11 February 2014
Available online 7 March 2014

KEYWORDS

3D US;
Uterine cavity anomalies;
Hysteroscopy;
Laparoscopy

Abstract *Objectives:* To determine whether three-dimensional (3D) ultrasound can replace combined hysteroscopic–laparoscopic role in differentiating bicornuate, septate and arcuate uterus.
Patient(s): Seventy-two patients with history of infertility, recurrent abortions or preterm labor with hysterosalpingographic and/or two dimensional ultrasound diagnosis of double uterine cavity anomaly were included in this study.
Intervention(s): Three-dimensional ultrasound (3D US) was done to all patients. Laparoscopy was done to differentiate bicornuate, septate and arcuate uterine anomalies. Simultaneous hysteroscopic metroplasty was done in patients with septate uteri.
Results: There was absolute concordance between 3D ultrasound and combined laparoscopic and hysteroscopic gold-standard in differentiation between bicornuate, septate and arcuate uteri in all our seventy two patients.
Conclusion(s): 3D US can differentiate septate, bicornuate and arcuate uteri and can eliminate the need for invasive laparoscopic diagnosis of these uterine anomalies.

* Corresponding author. Tel.: +20 01010109902.
E-mail addresses: ghadagouhar@hotmail.com, ghadagouhar@yahoo.com (G.K. Gouhar).
Peer review under responsibility of Egyptian Society of Radiology and Nuclear Medicine.

ELSEVIER Production and hosting by Elsevier

1. Introduction

Uterine malformations make up a heterogeneous group of congenital anomalies that can result from the underdevelopment of the mullerian duct disorders in their fusion and/or alterations in septum resorption. They are estimated to occur in 0.4% (0.1–3%) of the general population (1,2) in 13.3%

0378-603X © 2014 Production and hosting by Elsevier B.V. on behalf of Egyptian Society of Radiology and Nuclear Medicine.
Open access under CC BY-NC-ND license. http://dx.doi.org/10.1016/j.ejrnm.2014.02.010

of infertile patients (3) and between 3% and 38% in patients with repeated spontaneous miscarriages (4–7).

Congenital uterine anomalies are associated with adverse reproductive outcomes. The septate uterus is the most common müllerian anomaly, the one associated with the worst reproductive outcome, and the one most amenable to hysteroscopic correction. High rates of first trimester (25%) and second trimester (6%) losses have been described (5,8,9).

An accurate preoperative diagnosis of septate or bicornuate uterus should be confirmed before hysteroscopic septoplasty to avoid inadvertent fundal perforation of the indented central segment of the bicornuate uterus. If this diagnosis is not confirmed by preoperative imaging studies, laparoscopic guidance is suggested (10).

The conventional methods for the assessment of uterine morphology are hysterosalpingography, hysteroscopy and laparoscopy (11). Hysteroscopy remains the standard for evaluation of intracavitary abnormalities. Unfortunately, hysteroscopy does not allow evaluation of the external uterine contour, and thus a firm diagnosis of septate versus bicornuate uterus cannot be established simply by hysteroscopy alone (12).

Laparoscopy remains the gold standard for evaluation of the external uterine surface. A broad, un-notched fundus is typical of the septate uterus, whereas the image of two clearly separated uterine horns with fundal indentation is a definite indication of the bicornuate uterus. In some cases of septate uterus, it may be possible to see, in the median area of the serosal surface of the uterine fundus, a whitish triangle of tissue that is the septum itself (13). However, laparoscopy is an invasive procedure that needs anesthesia.

Most recently, three-dimensional ultrasound has been suggested as an improved tool for accessing mullerian abnormalities with a reported 91.6% correlation with laparoscopic findings (16). However, other studies are less compelling regarding three-dimensional ultrasound in adding information above and beyond that noted with standard two-dimensional imaging (17).

This study is aimed to determine whether three-dimensional (3D) ultrasound can differentiate between septate, bicornuate and arcute uteri accurately and so we can depend on its diagnosis solely without further need for confirmatory laparoscopic diagnosis.

2. Methods

This study was conducted in Ultrasonographic Unit, Obstetrics and Gynecology Department, and Cytogenetic Unit – Zagazig University hospital, Egypt, during the period from February 2006 to January 2012. It included 72 patients with suspected diagnosis of double uterine cavity either by conventional hysterosalpingography (HSG), diagnostic hysteroscopy or two-dimensional ultrasound (trans-abdominal or trans-vaginal) during their evaluation for infertility, repeated miscarriages and preterm birth problems.

Initially, three-dimensional Ultrasound (3D US) was done to all patients. Examinations were performed using Voluson 730 Pro V (GE Medical Systems, Zipf, Austria) ultrasound machine. All examinations were performed with real time 4D Endocavitary probe RIC 4–9 MHz.

We started with visualization of the uterus on 2D ultrasound in a strict mid-sagittal view, adjusting the capture window to

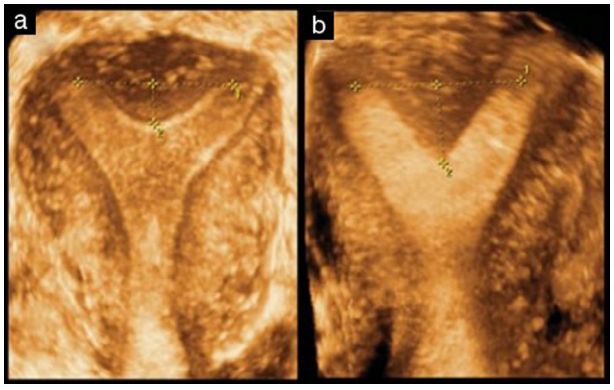


Fig. 2 (a) Three-dimensional surface rendered ultrasound image (coronal view) showing the normal outer uterine contour of a uterus that was identified as arcuate (rather than partial septate) because the fundal indentation appeared as an obtuse angle at the central point (14), <1.5 cm deep15. (b) A partial septate uterus characterized by a normal outer uterine contour, which could be differentiated from arcuate uterus because the fundal indentation was an acute angle at the central point, >1.5 cm deep.

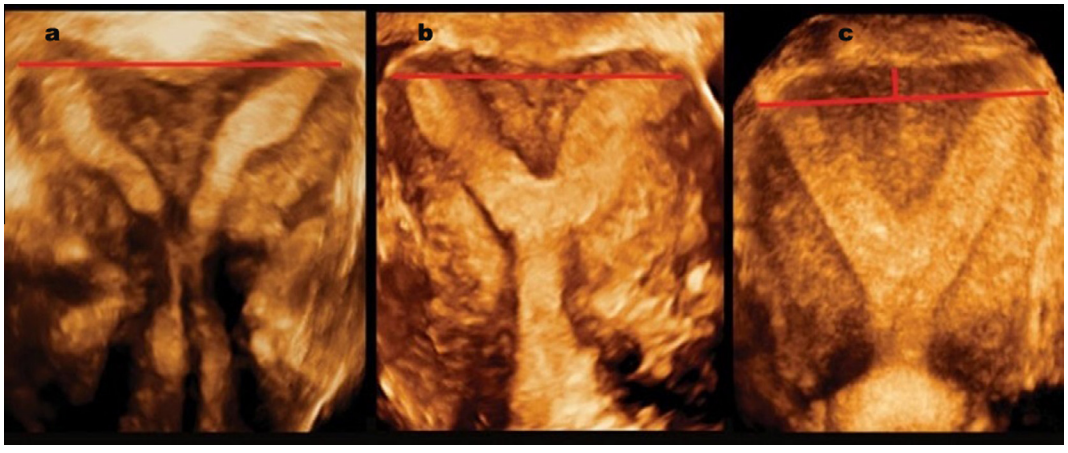


Fig. 1 Three-dimensional ultrasound showing the formula proposed by Troiano and McCarthy (13): a line was traced joining both horns of the uterine cavity. If this line crossed the fundus or was $\leqslant 5$ mm from it, the uterus was considered bicornuate (a and b); if it was >5 mm from the fundus it was considered septate, regardless of whether the fundus was dome-shaped (c), smooth or discretely notched.