Taiwanese Journal of Obstetrics & Gynecology 54 (2015) 737–741

Contents lists available at ScienceDirect

Taiwanese Journal of Obstetrics & Gynecology

journal homepage: www.tjog-online.com

Original Article

Accuracy of three dimensional ultrasound and treatment outcomes of intrauterine adhesion in infertile women

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ARTICLE INFO

Article history:
Accepted 30 July 2015

Keywords:
fertility
intrauterine adhesion
pregnancy
three-dimensional transvaginal ultrasound
uterine synechiae

ABSTRACT

Objective: To determine the accuracy and usefulness of three-dimensional transvaginal ultrasound (3D-TVUS) in diagnosing intrauterine adhesion (IUA) and to evaluate treatment outcomes associated with fertility.

Materials and Methods: IUA patients (110) underwent hysteroscopy to definitively diagnose and treat adhesiolysis. Morphologic characteristics of endometrium suggesting IUA, such as marginal irregularity, thinning, defects, obliteration, fibrosis, and calcification, were identified and recorded by 3D-TVUS. The sensitivity of 3D-TVUS findings and the attainment of postoperative fertility were evaluated prospectively. The clinical records were followed up for 2 years for obstetrical outcomes and analyzed.

Results: On comparing the findings of 3D-TVUS with those of hysteroscopy in 110 patients, 45 (88.23%) patients were confirmed as IUA by hysteroscopy among 51 (46.36%) patients, with one finding in 3D-TVUS; 42 (97.67%) patients were confirmed among 43 (39.09%) patients with two findings; and 16 (100%) patients were confirmed among 16 (14.55%) patients with over three findings. A pregnancy rate of eight out of 47 (17.02%) was achieved in patients who desired fertility.

Conclusion: 3D-TVUS assessment of the uterus provides an accurate depiction of adhesion and extent of cavity damage in patients with suspected IUA.

Introduction

Intrauterine adhesion (IUA), also known as Asherman's syndrome, is the replacement of the entire or partial uterine cavity with fibrous scar tissue. Menstrual disturbance, cyclic pelvic pain, recurrent pregnancy losses, and subfertility follow when the fibrous adhesion is formed in the intrauterine cavity. Most IUA occurs by iatrogenic manipulation, such as diagnostic curettage (1.6%), abdominal myomectomy (1.3%), cervical biopsy or polypectomy (0.5%), and insertion of intrauterine device (0.2%) [1]. Gravid uterus is especially vulnerable to an injury by manipulation, and IUA is followed by spontaneous or artificial abortion at rates of 7% to 30% [2]. IUA often results in recurrent miscarriage (range, 5% to 39%) [3–6]. Another cause of IUA is endometrial tuberculosis with an incidence is 4%, which induces the obliteration of the uterine cavity in > 50% of cases. In endometrial tuberculosis, the performance of surgery is generally low and is often recurrent, making future fertility unlikely [1,3].

The imaging modalities used to diagnose IUA are hysterosalpingography (HSG), ultrasound, sonohysterography, and magnetic resonance imaging (MRI). Hysteroscopy is capable of both IUA diagnosis and treatment, and HSG is most widely utilized for diagnosis when IUA is suspected. However, it also has shortcomings, such as invasiveness and radiation exposure [7–9]. IUA can be

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http://dx.doi.org/10.1016/j.tjog.2015.10.011

diagnosed by ultrasound, with the characteristic appearance of hyperechoic areas within the endometrium. Two-dimensional transvaginal ultrasound (2D-TVUS) is noninvasive, relatively economical, and readily available. However, the sensitivity and specificity of 2D-TVUS for IUA are not high enough for clinical use (52% and 11%, respectively) [4].

3D-TVUS has recently been adopted in the gynecological sciences. By enabling multiplanar displays, which simultaneously visualizes three orthogonal scan planes, 3D-TVUS boasts an additional advantage of obtaining anatomical views that are often unattainable by 2D-TVUS.

The American Fertility Society proposed an IUA classification in 1988 [5]. It classifies IUAs into mild, moderate, and severe forms by scoring the extent of endometrial cavity obliteration, appearance of adhesions, and menstrual characteristics, based on hysteroscopic or HSG assessment. However, it is not without the disadvantage of invasiveness.

This study was conducted to assess the value of 3D-TVUS for diagnosing IUA through comparisons with hysteroscopic findings. Furthermore, we assessed the treatment outcomes of IUA using hysteroscopic adhesiolysis, specifically associated with pregnancy.

Materials and methods

Patient characteristics

This study was carried out at the Fertility Center of Kosin University Hospital, Busan, South Korea, and following Institutional Review Board approval (KUCMIRB 12-024).

There were 110 cases of IUA primarily diagnosed by 3D-TVUS among a total of 4577 first-visits between November 2008 and October 2010. Hysteroscopy was performed for the final diagnosis and treatment. The hysteroscopic findings were compared with 3D-TVUS imaging. The operative outcomes were also analyzed and their hospital course was carefully observed for comparison with 3D-TVUS results.

The cause for IUA was analyzed in the 110 women as follows: history of endometrial curettage, hysteroscopic surgery, and genital tuberculosis.

Ultrasound evaluation

The patients were examined by 3D-TVUS (Accuvix XQ, Medison, Seoul, Korea) using a 7.5 MHz transvaginal probe. Every examination was initiated with a 2D-TVUS evaluation of the endometrial cavity and, after switching to 3D-TVUS, the region of interest was selected with the volume box and the volume acquired. When possible, information regarding the scan was stored on a 540-MB removable hard disk for further evaluation and calculations. For the purpose of standardization, all patients were evaluated, imaged, and operated on by the same physician.

In 3D-TVUS, the morphological characteristics of the endometrium suggesting IUA were classified into six categories: marginal irregularity (in coronal plane), thinning (< 2 mm), defect (interrupted endometrial line), obliteration (undetectable endometrium suggesting extensive adhesion), fibrosis (hyperechoic lesion without posterior shadowing), or calcification (hyperechoic lesion with posterior shadowing; Figure 1). The participants were divided

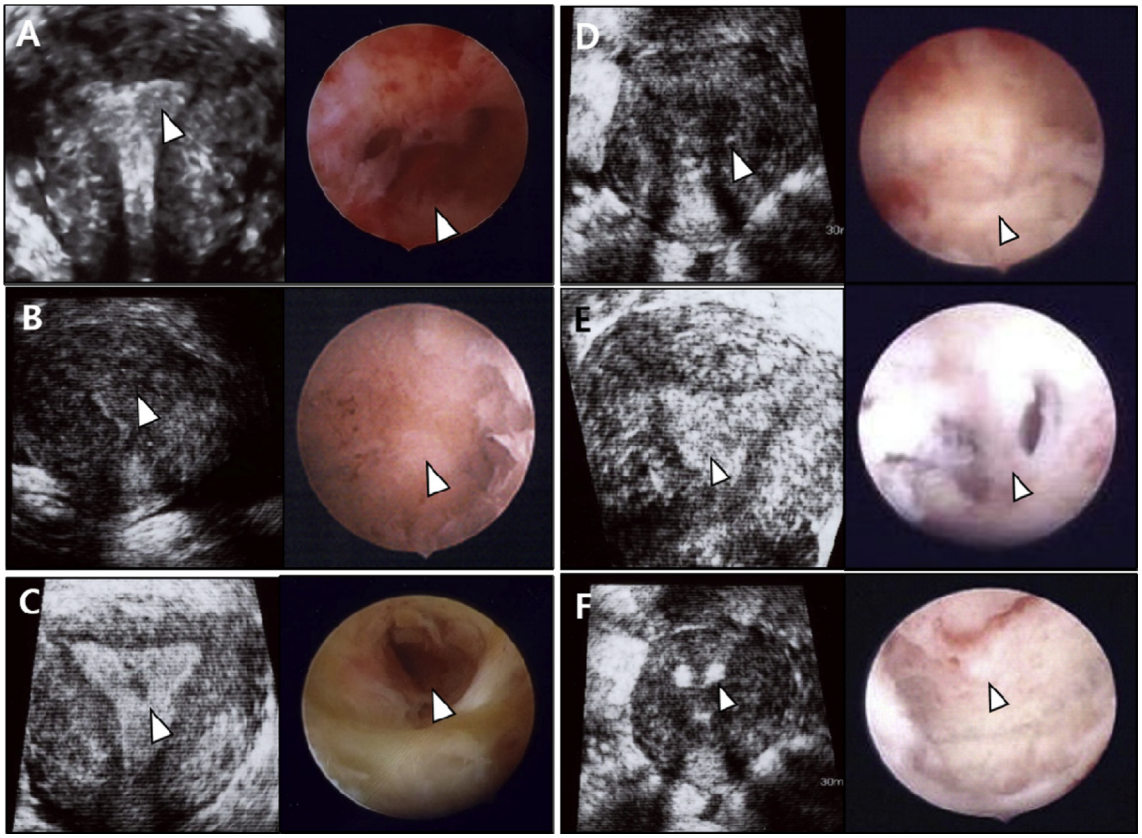

Figure 1. The classification of endometrial findings using three-dimensional ultrasound and suggesting intrauterine adhesion matched hysteroscopic findings: (A) marginal irregularity in sagittal plane, (B) thinning, (C) defect, (D) obliteration, (E) fibrosis, and (F) calcification.