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ORIGINAL ARTICLE

# Prediction of endometriosis by transvaginal ultrasound in reproductive-age women with normal ovarian size

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**KEYWORDS**

Endometriosis;
Transvaginal sonography;
TVS-based soft markers;
Laparoscopy

**Abstract** *Objective:* To predict endometriosis by transvaginal ultrasound (TVS) in reproductive-age women with normal ovarian size.

*Design:* Prospective study.

*Setting:* El-Shatby Maternity Hospital, Alexandria University.

*Patients:* 125 Women with symptoms suggestive of endometriosis and with normal ovarian size during TVS.

*Interventions:* Patients were subjected to high frequency ultrasound and evaluated for the presence of ultrasound signs of endometriosis (TVS-based soft markers). All patients had laparoscopy (gold standard) immediately after TVS for documentation of the presence of endometriosis.

*Main outcome measures:* Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and diagnostic accuracy of TVS and of the TVS-based soft markers in diagnosing endometriosis.

*Results:* Endometriosis was confirmed laparoscopicaly in 68/125 patients (54.4%). The sensitivity, specificity, PPV, NPV and diagnostic accuracy of TVS in diagnosing endometriosis were 85.3%, 80.7%, 84.1%, 82.1% and 83.2%, respectively. Six TVS-based soft markers showed significant association ($P < 0.05$) with endometriosis (ovaries not at the same level, high left ovary, ovarian fixation to uterus, tender ultrasound, ovarian fixation to iliac vessels and non visualization of left ovary) with sensitivities of 85.3%, 80.9%, 80.9%, 66.2%, 55.9% and 55.9%, respectively. These markers could be considered as positive soft markers to predict endometriosis. The addition of these soft markers could improve the sensitivity, specificity, PPV, NPV and diagnostic accuracy to 97.3%, 98.5%, 95.7%, 89.9% and 91.2%, respectively.

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*Conclusion:* TVS appears to be a useful imaging method for the prediction of endometriosis. The inclusion of TVS-based positive soft markers either alone or in combination improves our ability to predict endometriosis.



## Introduction

Endometriosis is a common gynecological condition affecting millions of women worldwide. Estimates of prevalence vary widely but up to 15% of women in their reproductive years may be affected (1). Endometriosis is defined as the presence of endometrial tissue (glands and stroma) outside the uterine cavity, which impairs quality of life (2).

The most common sites of endometriosis are the ovaries and the pelvic peritoneum, followed by deep infiltrating sites (3). Deep infiltrating endometriosis (DIE) is defined by the presence of endometrial implants, fibrosis and muscular hyperplasia below the peritoneum ($>5$ mm) and involves, in descending order of frequency, the uterosacral ligaments, the rectosigmoid colon, the vagina and the bladder (3,4).

Endometriosis usually presents with painful symptoms such as dysmenorrhea, dyspareunia, non menstrual pelvic pain or it may be discovered accidently during investigation for infertility (5).

Diagnosing endometriosis remains a dilemma due to the non specific nature of the symptoms and the difficulty in distinguishing pelvic pain due to endometriosis from that caused by pelvic infection or non gynecological conditions such as urologic, gastrointestinal or musculoskeletal diseases (6). This results in a considerable diagnostic delay ranging from 7 to 12 years from the presenting symptoms (7), with considerable deterioration in quality of life and high psychologic morbidily (2,8).

Laparoscopy is the gold standard for the diagnosis of endometriosis. Also, histological confirmation is not always obtained (5). However, diagnostic laparoscopy requires a general anesthesia and is associated with about 3% risk of minor complications (nausea, vomiting or shoulder tip pain) and 0.5% risk of major complication (e.g. bowel perforation) (9,10). Also, surgical diagnosis may either overestimate or underestimate the extent of endometriosis due to variation in the size or depth and location of the lesion (11).

Therefore, a proper preoperative evaluation is mandatory to diagnose endometriosis. Since routine clinical examination has limited capacity to diagnose and quantify DIE (12,13), therefore, there has been a considerable interest in using non-invasive techniques to detect endometriosis.

Several imaging modalities have been proposed to diagnose the presence, location and extent of endometriosis such as sonography, and magnetic resonance imaging (MRI) (14).

Transvaginal sonography (TVS) should be considered the first-line imaging technique not only because of its availability, high diffusion, relatively low cost and patient acceptability, but particularly because it is the most accurate diagnostic modality in the majority of both ovarian and extraovarian endometriosis. Also, the rapid technical evolution of ultrasound machines and probes has permitted us to improve the quality and resolution of the images obtained (14–16).

Conventionally, an ultrasound scan will report the presence or absence of structural abnormality such as ovarian cysts or hydrosalpinges (hard markers). Other information are available for the presence or absence of pelvic pathology based on soft markers (e.g. the degree of ovarian motility, tenderness, or obliterated Douglas pouch) (17). These findings are usually not reported during routine scans. However, they have the potential to improve the diagnostic efficacy of TVS.

The aim of this study was to evaluate different ultrasonic signs (soft markers) for prediction of endometriosis in reproductive-age women with symptoms suggestive of endometriosis but with normal ovarian size and no evidence of ovarian cyst.

## Patients and methods

This prospective study was carried out on 125 consecutive women with any of the symptoms suggestive of endometriosis i.e. dysmenorrhea, dyspareunia, chronic pelvic pain, dyschezia, dysuria or infertility who were booked for laparoscopy, Table 1. The women ranged in age from 19–46 years (median 29 years). The study was approved by the local ethics committee and informed consent was obtained from all patients enrolled in the study.

Inclusion criteria were women during their reproductive-age period, pain in the lower abdomen or pelvis for at least 6-months duration, occurring continuously or intermittently and not associated exclusively with menstruation or sexual intercourse, women with infertility, regular menstrual cycle, no medications for infertility or pelvic pain treatment in the preceding three months, the availability of complete past medical, social, obstetric and gynecological history, and women with normal size ovary during TVS.

Exclusion criteria were virginity of the patient, pregnant women, women with ovarian cyst of any type (to avoid falcies in identifying ovarian cyst type, also presence of endometriomas is considered a hard marker for endometriosis), those who had any type of genital malformation that made physical examination or TVS impossible, history of gynecological cancer or previous surgery for DIE, any abdominal or pelvic surgery, patients with premature ovarian failure (POF) or patients with large uterine masses.

All patients were subjected to detailed medical history and were specifically asked about symptoms associated with endometriosis. Patients underwent clinical examination (digital vaginal examination) and were submitted to TVS followed immediately by laparoscopy.

All women were subjected to high frequency ultrasound evaluation by experienced sonographer using two machines; IBE-2500 version 1.0 frequency 5MTZ, China and Medison SonoAce-X6 frequency 5MHZ. The operator, in addition to routine analysis, was asked to comment on the presence or absence of all pathology but specifically on soft markers of endometriosis The duration of detailed U/S was variable ranging