

The accuracy of examination under anesthesia and transvaginal sonography in evaluating ovarian size

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Abstract

Objective. To compare pelvic examination under anesthesia to transvaginal sonography (TVS) as a method for ovarian detection and measurement.

Methods. Two hundred and eighty-nine ovaries from 151 women were evaluated. After induction of anesthesia, a complete pelvic examination and TVS were performed, and the ovaries were removed surgically. Ovarian dimensions generated sonographically and estimated on clinical examination were compared to those obtained from the measured surgical specimen.

Results. Forty-four percent of ovaries were palpable clinically whereas 85% were visualized sonographically ($P < 0.001$). Right ovaries were palpable more frequently than left ovaries ($P < 0.01$). Ovaries were detected clinically in 30% of women ≥ 55 years of age versus 51% of women < 55 years of age ($P < 0.05$), in 9% of women weighing ≥ 200 lb versus 55% of women weighing < 200 lb ($P < 0.001$), and in 12% of women with a uterine weight ≥ 200 g versus 51% of women with a uterine weight < 200 g ($P < 0.001$). TVS was significantly more accurate than clinical examination in detecting ovaries in women with these high risk characteristics.

Conclusions. TVS is significantly more accurate than clinical examination in detecting ovaries and in defining their dimensions. Ovaries frequently are not palpable in women ≥ 55 years of age, women who weigh ≥ 200 lb, or women with an enlarged uterus (> 200 g). The addition of TVS to annual pelvic examination may be beneficial in women ≥ 55 years of age who are overweight and therefore at high risk to develop ovarian cancer.

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Introduction

There is little objective data in the literature concerning the accuracy of pelvic examination in detecting ovaries and defining ovarian size. Nevertheless, bimanual pelvic examination is routinely used as the initial means to detect ovarian enlargement and to determine indications for operative intervention in women with ovarian tumors. This is an

important health care issue for women, since the identification of subtle changes in ovarian volume or morphology may be the only way to detect ovarian cancer when it is curable. Ovarian cancer remains the leading cause of gynecologic cancer death in the United States with over 14,000 women dying of this disease annually [1]. In the last decade, there have been advances in ultrasound technology and its application to gynecology. Transvaginal sonography (TVS) has been shown to be time efficient, well accepted by patients, and associated with minimal interobserver variation [2,3]. Numerous publications have addressed the efficacy of TVS in the diagnosis and evaluation of ovarian abnormalities [4–7].

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Table 1
Clinical characteristics of patients evaluated ($n = 151$)

	Mean	Range
Age (years)	51.2	27–86
Weight (lb)	172	93–318
Height (in.)	63.6	52–70
Prior oophorectomy		13
Total ovaries evaluated		289
Total uteri evaluated		140

The present prospective investigation was undertaken to compare the accuracy of pelvic examination under anesthesia (EUA), and TVS in the detection and dimensional description of ovaries. Both EUA and TVS findings were correlated with surgical findings.

Materials and methods

One hundred and fifty-one women were enrolled in a prospective trial at the University of Kentucky to compare the accuracy of EUA and TVS in estimating ovarian volume. All patients gave written informed consent to participate in this investigation as approved by the Institutional Review Board. Indications for surgery included uterine or ovarian tumors, pelvic organ prolapse, endometriosis, endometrial hyperplasia or malignancy, recurrent cervical intraepithelial neoplasia, and chronic pelvic pain. Data concerning age, height, and weight were recorded on each patient.

After induction of general anesthesia, the patient was placed in the dorsal lithotomy position. An examination under anesthesia was performed by one of the authors (FRU, PDD, JVN) and the presence or absence of each ovary was noted. Length and width were estimated and recorded for each ovary. Immediately after pelvic examination, TVS was performed independently, often by different investigators, using an Aloka 620 unit with a 5.0-MHz vaginal probe. Ovarian length, width, and height were estimated from sonographically generated images. Ovarian volumes were calculated using the prolate ellipsoid formula (volume = length \times width \times height \times 0.523) [4]. Estimation of ovarian volume on clinical examination was calculated using the same formula (with the assumption that ovarian width equals height).

Table 2
Clinical detection of ovaries related to patient weight, body surface area, and uterine weight

	Patients	Ovaries	Ovaries detected (%)	Significance
Patient age <55 years	105	201	102 (51%)	$P < 0.05$
Patient age ≥ 55 years	46	88	26 (30%)	
Patient weight <200 lb	117	223	122 (55%)	$P < 0.001$
Patient weight ≥ 200 lb	34	66	6 (9%)	
Uterine weight <200 g	103	194	100 (52%)	$P < 0.001$
Uterine weight ≥ 200 g	37	74	12 (16%)	

Table 3
Sonographic detection of ovaries related to patient weight, body surface area, and uterine weight

	Patients	Ovaries	Ovaries detected (%)	Significance
Patient age <55 years	105	201	180 (90%)	NS
Patient age ≥ 55 years	46	88	65 (74%)	
Patient weight <200 lb	117	223	197 (88%)	NS
Patient weight ≥ 200 lb	34	66	48 (73%)	
Uterine weight <200 g	103	194	167 (86%)	NS
Uterine weight ≥ 200 g	37	74	59 (80%)	

After operative removal, ovaries were measured before fixation in three dimensions (length, height, and width), by the pathologist without knowledge of the clinical or ultrasound findings, and uterine weights were recorded. Comparisons were made between ovarian dimensions as estimated on pelvic examination, ovarian dimensions generated by transvaginal sonography, and direct measurement of the surgical specimen. All data were entered into a MEDLOG database. Statistical analyses were performed using the Student's t test, chi-square, and linear regression. Statistical significance was defined by a P value ≤ 0.05 .

Results

Clinical characteristics of the 151 patients studied are illustrated in Table 1. Since 13 patients had a prior unilateral salpingo-oophorectomy, 289 ovaries were evaluated both by clinical examination and transvaginal sonography. One hundred and twenty-eight of 289 ovaries (44%) were clinically palpable. Ovaries were palpable on the right side in 53% of cases and on the left side in 32% of cases ($P < 0.001$). The accuracy of pelvic examination in ovarian detection was related to patient age, patient weight, and uterine weight (Table 2). Ovaries were palpable in only 30% of women ≥ 55 years of age as opposed to 51% in younger women ($P < 0.05$). Only 6 of 66 (9%) ovaries were palpable in women weighing ≥ 200 lb as opposed to 122 of 223 (55%) ovaries in women weighing <200 lb ($P < 0.001$). Also, uterine size was related to the accuracy of clinical examination in ovarian detection. Ovaries were detected on pelvic examination in 51% of women with a uterine weight of <200 g as compared to only 12% in women with a uterine weight of ≥ 200 g ($P < 0.001$).

Table 4
Comparison of clinical examination and transvaginal sonography (TVS) in the detection of ovaries in women with high risk characteristics

Characteristic	Ovaries	Clinically detected (%)	Sonographically detected (%)	Significance
Patient age ≥ 55 years	88	26 (30%)	65 (74%)	$P < 0.001$
Patient weight ≥ 200 lb	66	6 (9%)	48 (73%)	$P < 0.001$
Uterine weight ≥ 200 g	74	12 (16%)	59 (80%)	$P < 0.001$

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