The Role of Physician Experience in Pelvic Examination Accuracy

Daniel M. Avery, Jr., MD, FAASS
Jason M. Parton, MA, MS
John C. Higginbotham, PhD, MPH

Objective

The primary goal of this study was to determine the role of physician experience in clinical pelvic examination accuracy.

Methods

A retrospective chart review of 507 women aged 15 to 70 years of age who had received a pelvic ultrasound examination between November 1, 2008, and October 30, 2009, at the University Medical Center OB/GYN Clinic was undertaken. Of this number, 356 had concurrently received a clinical pelvic examination.

Results

Approximately 61% of abnormal clinical pelvic examinations were confirmed by pelvic ultrasound examination, while 92% of normal clinical pelvic examinations were confirmed by pelvic ultrasound examination. Physicians with less experience commonly diagnosed normal clinical pelvic examinations. Experienced physicians more frequently diagnosed abnormal clinical pelvic examinations. Both examinations were concordant 75% of the time.

Conclusions

Our results indicate that inexperienced physicians commonly diagnose normal pelvic examinations, while experienced physicians are more likely to diagnose abnormal clinical pelvic examinations that are confirmed by ultrasound examination. Examinations were concordant 75% of the time.

Introduction

The clinical pelvic examination is an integral component of the examination of female patients to assess the external genitalia, vagina, cervix, uterus and adnexa.[1,2,3,4] These exams screen the lower genital tract for infection, dysplasia, cancer, pelvic relaxation, pelvic floor abnormalities, abnormal bleeding, incontinence, tenderness, dyspareunia, foreign bodies, sexual assault, trauma, vaginismus as well as uterine and adnexal abnormalities.[3,5,6,7,8,9] Women who present for medical care with pelvic complaints usually receive a clinical pelvic examination.[10]

In the study by Padilla et al.[4], the sensitivity for pelvic examination was lowest for medical students and highest for attending gynecologists who had the best consistent performance.[4,11] Years of experience improved diagnostic ability but not adnexal assessment.[4,11] The diagnostic value and efficacy of clinical pelvic examination has been questioned because of the significant limitations of bi-manual examination of the adnexa.[4,6] Detection of ovarian cancer has also been shown not to be reliable.[4,6] Some have reported that masses as large as 5 centimeters in diameter are frequently missed at pelvic examination.[6] A mobile ovarian mass (i.e., one that is not fixed in the pelvis) can slip between the examining hands at pelvic examination and thus escape detection in even the most experienced hands. Consequently, the routine pelvic bimanual examination may not meet the standards of good evidence-based medicine.[4] A negative pelvic examination may even falsely reassure the patient and physician that there is no ovarian cancer present.[3] Other documented limiting factors of pelvic examination relate to patient size and patient cooperation.[12]

A study by Padilla et al. compared pelvic examination under anesthesia with diagnostic laparoscopy or laparotomy and found that even under the best circumstances, bimanual examination has significant limitations for the evaluation of the adnexa.[4,6] Other factors that have been found in the literature to compromise assessment of the uterus and adnexal masses relate to patient's obesity, uterine size, abdominal scars, atrophic changes, pelvic organ prolapse, uterine mobility, fixation in the pelvis, an intact hymen, lack of sexual activity, position during the examination as well as infrequent examination, insufficient training of the examiner, the examiner's gender, integrity during the examination, and the patient's level of trust in the examiner.[6,8,9,10,13] Compromised pelvic examinations are also associated with anxiety and pain.[13]

Pelvic examinations have been shown to be more accurate in evaluating the uterus rather than the adnexa and correlate well with ultrasound when uterine fibroids are present.[4,7,14]

Materials and Methods

This study was a retrospective chart review of pelvic ultrasound examinations in patients who had previously undergone clinical pelvic examinations. These patients had been seen at the University Medical Center at the University of Alabama School of Medicine in Tuscaloosa, Alabama, between November 1, 2008, and October 30, 2009. The study was approved by the Institutional Review Board of the University of Alabama.

For the purposes of this study a clinical pelvic examination was considered normal if the uterus was less than eight weeks gestation size or less than 8 centimeters in length and there were no adnexal masses or cysts 4 centimeters or greater; anything larger than these dimensions was considered abnormal. A pelvic ultrasound examination was considered normal if the uterus was less than 8 centimeters in length and there were no adnexal masses or cysts 4 centimeters or greater; anything larger than these dimensions was considered abnormal. The uterus may be enlarged, pregnant, or contain a mass, such as a fibroid. The adnexa may contain an ovarian cyst or mass 4 centimeters or greater. The clinical records of the examinations and ultrasounds were evaluated by the principal investigator, whose clinical examinations and pelvic ultrasounds had been excluded from the study. Pelvic ultrasound examinations were performed by a single, experienced ultrasound technician with 30 years experience on a General Electric Voluson 730 PRO Ultrasound. Results of the ultrasounds were interpreted by ultrasound trained OB/GYN physicians and scanned into the electronic medical record of the patients.

Clinical pelvic examinations were performed by OB/GYN attending physicians at the University of Alabama School of Medicine in Tuscaloosa who were all either board certified or board eligible in OB/GYN. Years of experience performing pelvic examinations ranged from six to thirty years. Clinical pelvic examinations were indicated by a pelvic or gynecologic complaint or initial pelvic examination as part of an initial obstetric examination for pregnancy. Pelvic examinations were performed by an initial speculum examination followed by a gloved bimanual pelvic examination. Results were recorded in the patient's chart in an electronic medical record.

Analysis was conducted on a sample of 356 patients using SAS software version 9.1.3. The sample consisted of measurements of physician years of experience, results from clinical pelvic examinations and pelvic ultrasound examinations, weights and ages of the patients, and a created variable examining continuity between the exams. This study investigated the frequency of these variables along with univariate inferential comparisons.

Results

The retrospective study consisted of 507 patients aged 15 to 70 years of age who had received a pelvic ultrasound examination between November 1, 2008, and October 30, 2009, at the University Medical Center OB/GYN Clinic at The University of Alabama School of Medicine, Tuscaloosa Campus. Seventy percent of these women (356) had previously undergone a clinical pelvic examination. Results indicate an abnormal frequency for pelvic ultrasound exams at 50.69%, compared to 37.35% for a clinical bimanual pelvic exam. Thirty percent of patients did not receive a clinical pelvic exam. The two examinations were concordant 75% of the time.

The sample of 507 patients with ultrasound examinations was studied in relation to patients who also received a clinical pelvic exam. The resulting number of patients receiving both an ultrasound exam and a clinical exam was 356. To understand why, a rate comparison was conducted between physicians who performed a pelvic ultrasound exam and those who also performed a clinical pelvic exam. An analysis showed a rate ratio of 1.42 (1.35, 1.51); 95% indicating physicians are 42% more likely to conduct only an ultrasound exam rather than both an ultrasound and a clinical exam. Results are shown in Table 1.

Table 1: Sample Characteristics.

		Frequency	*Percent*
Ultrasound Exam	Abnormal	257	50.69%
	Normal	250	49.31%
Clinical Pelvic Exam	Abnormal	133	26.23%
	Normal	223	43.98%
	Not Done	151	29.78%
Consistency of Exams	Concordant	267	75.00%
	Discordant	89	25.00%

Another interest of this study was to inspect if there is a correlation in the number of years a physician has been practicing and whether or not he or she performs a clinical pelvic exam. The analysis shows that the proportion of pelvic exams conducted differs significantly by the number of years of physician experience, χ^2 (2, N = 507) = 6.56, $p < 0.05$. Results indicate catego-

ries 0-10 and 30+ years of experience perform the most pelvic examinations more than 70% of the time, while the 20-29 category perform pelvic exams only 58.11% of the time. Results are shown in Table 2.

Since this study has, in essence, two samples (patients who received an ultrasound exam and those who received both an ultrasound exam and a clinical pelvic exam), a measure of linkage was created to inspect the continuity of the two exams. This inspection of concordance between a clinical pelvic exam and an ultrasound exam was conducted using a cross tabulation with a Pearson Chi-square. The analysis reveals a statistical difference between the proportions of ultrasound and clinical pelvic

Table 2: Crosstab and Chi-Square Analysis.

Conducted both ultrasound and clinical exam, n = 356

		Clinical Exam: Abnormal	Clinical Exam: Normal	Statistic	*df*	Probability
Ultrasound Exam	Abnormal	120 (90.23%)	76 (34.08%)	$\chi^2 = 106.13$	1	< 0.0001
	Normal	13 (34.36%)	147 (65.92%)			

Exams by years of physician experience, n = 507

		Years of Physician Experience: 0 - 10	20 - 29	30 +	Statistic	*df*	Probability
Ultrasound Exam	Abnormal	85 (46.45%)	38 (51.35%)	134 (53.60%)	$\chi^2 = 2.18$	2	NS
	Normal	98 (53.55%)	36 (48.65%)	116 (46.40%)			
Clinical Exam	Abnormal	27 (14.75%)	13 (17.57%)	93 (37.20%)	$\chi^2 = 36.60$	4	< 0.0001
	Normal	102 (55.74%)	30 (40.54%)	91 (36.40%)			
	Not Done	54 (29.51%)	31 (41.89%)	66 (26.40%)			
Performed Pelvic Exam	Yes	129 (70.49%)	43 (58.11%)	184 (73.60%)	$\chi^2 = 6.56$	2	0.0376
	No	54 (29.51%)	31 (41.89%)	66 (26.40%)			
Consistency of Exams	Concordant	94 (72.87%)	25 (58.14%)	148 (80.43%)	$\chi^2 = 9.73$	2	0.0077
	Discordant	35 (27.13%)	18 (41.86%)	36 (19.57%)			

(NS = Not significant at $\alpha > 0.05$)

exam outcomes compared to ultrasound pelvic exam outcomes, χ^2 (1, N = 356) = 106.13, $p < 0.001$. Patients diagnosed as abnormal with an ultrasound examination were diagnosed as normal with a clinical examination 34% of the time. As a total comparison, diagnosis from a clinical examination was normal 62.64% of the time while an ultrasound exam diagnosis was normal only 44.94% of the time. This result demonstrates that ultrasound pelvic exams show abnormalities 17.70% more than clinical pelvic exams, and, of those clinical pelvic exams that provided a normal diagnosis, 76 were diagnosed as abnormal by ultrasound exam. Additional methods were performed to further examine the concordance of the ultrasound and bimanual pelvic exams by the years of physician experience. Ultrasound and clinical exams with the same outcomes were designated as concordant, while differing results were deemed discordant. Results of cross tabulation and Pearson Chi-Square show a statistically significant difference in proportions of concordant and discordant outcomes as related to a physician's years of experience, χ^2 (2, N = 356) = 9.73, $p < 0.05$, with the experience category 30+ resulting in the most concordant outcome (80.43%). The years-of-experience group with the most discordant outcomes is 20-29 (41.86%).

Discussion

This study confirms the accuracy of pelvic ultrasound examinations compared to clinical bimanual pelvic examinations. An ultrasound examination has been shown to have improved accuracy over pelvic bimanual examination.[11,13] Transvaginal ultrasonography has been shown to produce an accurate assessment of the uterus and adnexa.[10,11,14] Transvaginal ultrasonography is superior to vaginal bimanual examination in diagnosing gynecologic pathology, especially ovarian masses.[15] This study raises the question of the reliability of the pelvic exam for evaluating adnexal masses especially ovarian cancer.[6] When an ovary is enlarged by pelvic examination, a transvaginal ultrasound should be performed.[16]

Physicians with the least experience in this study were good at diagnosing normal pelvic examinations confirmed by sonar. When pelvic sonar was normal, there was a 92% chance that any physician would confirm it clinically. However, more experienced physicians were more accurate at diagnosing abnormal pelvic exams.

In the study by Padilla et al.,[4] the sensitivity for pelvic examination was lowest for medical students and best for attending gynecologists, who had the best consistent performance.[4,11] Years of experience improved diagnostic ability but not adnexal assessment.[4,11] Pelvic examination may be a good screening tool as long as both the examiner and the patient appreciate the limitations.[6] A negative pelvic examination may even falsely reassure the patient that there is no evidence of ovarian cancer when that is indeed not the case.[7]

Daniel M. Avery, Jr., MD, FAASS, is Professor and Chairman, OB/GYN Department at The University of Alabama School of Medicine.

Jason M. Parton, MA, MS, is Epidemiologist and Project Director, Rural Health Institute for Research and Translational Science, College of Community Health Sciences, University of Alabama School of Medicine, Tuscaloosa.

John C. Higginbotham, PhD, MPH, is Associate Dean, Research and Health Policy; Director, Institute for Rural Health Research; Professor, Chair Community and Rural Medicine.

Potential Financial Conflicts of Interest: By AJCM® policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article that might create any potential conflict of interest. The author has stated that no such relationships exist.

References

1. Bell WB. *The Principles of Gynaecology*. Longman, Green and Co. London. 1910. 113.
2. Sims JM. *Clinical Notes on Uterine Surgery*. Robert Hardwicke. Piccadilly. 1866. 6-25, 261.
3. American College of Obstetrics and Gynecology. Routine Pelvic Examination and Cervical Cytology Screening. ACOG Committee Opinion. *Obstet Gynecol*. 2009;113(5):1190-3.
4. Padilla LA, Radosevich DM, Milad MP. Limitations of the Pelvic Examination for Evaluation of the Female Pelvic Organs. *International Journal of Gynecology and Obstetrics*. 2005;88:84-8.
5. Stewart RA, Thistlethwaite J, Evans R. Pelvic Examination of Asymptomatic Women. *Australian Family Physician*. 2008;37(6):493-6.
6. Padilla LA, Radosevich DM, Milad MP. Accuracy of the Pelvic Examination in Detecting Adnexal Masses. *Obstet Gynecol*. 2000;96(4):593-8.
7. Wakley G. NLH Primary Care Answering Service (Website Review). *J Fam Plann Reprod Health Care*. 2005;31(4):337.
8. Blake DR, Fletcher K, Joshi N, Emans SJ. Identification of Symptoms that Indicate that a Pelvic Examination is Necessary to Exclude PID in Adolescent Women. *J Pediatr Adolesc Gynecol*. 2003;16:25-30.
9. Desai AK, Jaiyesimi RAK. A Survey of the Value of Routine Intimate Examination and Related Practices in Subfertile Couples. *Journal of Obstetrics and Gynecology*. 2007;27(8):840-44.
10. Condous G, Van Calster B, Van Huffel S, Lam A. What is the value of Preoperative Bimanual Pelvic Examination in Women Undergoing Laparoscopic Total hysterectomy? *Journal of Minimally Invasive Gynecology*. 2007;14(3):334-8.
11. Carter JC, Fowler J, Carson L, Carlson J, Twiggs LB. How Accurate is the Pelvic Examination as Compared to Vaginal Sonography? *J Reprod Med*. 1994;39(1):32-4.
12. Russell DJ. The Female Pelvic Mass. *Office Gynecology*. 1995;79(6):1481-1493.
13. Tayal VS, Crean CA, Norton J, Schulz CJ, Bacalis KN, Bliss S. Prospective Comparative Trial of Endovaginal Sonographic Bimanual Examination Versus Traditional Digital Bimanual Examination in Nonpregnant Women with Lower Abdominal pain with Regard to Body Mass Index Classification. *J Ultrasound Med*. 2008;27(8):1171-7.
14. Cantuaria GHC, Angioli R, Frost L, Duncan R, Penalaver MA. Comparison of Bimanual Examination with Ultrasound Examination Before Hysterectomy for Uterine Leiomyoma. *Obstet Gynecol*. 1998;92(1):109-12.
15. Frederick JL, Paulson RJ, Sauer MV. Routine Use of vaginal Ultrasonography in the Preoperative Evaluation of Gynecologic Patients. *J Reprod Med*. 1991;36(11):779-82.
16. Rulin MC, Preston AL. Adnexal Masses in Postmenopausal Women. *Obstet Gynecol*. 1987;70(4):578-81.