

Clinical value of mammography for symptomatic women 35 years of age and younger

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OBJECTIVE: This retrospective observational study was designed to answer the following question: Is mammography clinically effective in the evaluation of women ≤ 35 years old with breast symptoms or findings?

STUDY DESIGN: A retrospective review was undertaken of 1908 consecutive initial mammogram reports of symptomatic women ≤ 35 years old who came to a referral breast clinic. The clinic records were analyzed for the working diagnoses and management plans before and after the input of the initial mammogram reports.

RESULTS: Of the 4160 initial mammograms of women who came (1992-1995) to the Breast Diagnostic Center at Women's and Children's Hospital, Los Angeles, Calif, 1908 were of women ≤ 35 years old. The mammogram reports were reviewed and tabulated by age group for mammography recommendations. The working diagnoses and management plans in the center's charts were retrospectively evaluated before and after the mammogram reports to ascertain whether the mammogram reports altered clinical management in this patient population and age group. No clinically unsuspected cancers were perceived by mammography performed at the center in women ≤ 35 years old. (All of the 23 invasive cancers were palpable and had prior diagnoses after fine-needle aspiration biopsy.) The initial mammogram reports did not change the working diagnosis or clinical management of these cases in this patient population and clinic setting. Ultrasonography was recommended by the radiologists in 37% of the study cases.

CONCLUSIONS: Routine initial mammography was not cost-effective or clinically beneficial in the evaluation of breast symptoms or findings and management of the cases of women ≤ 35 years old who came to our center. (*Am J Obstet Gynecol* 1999;180:1484-90.)

Key words: Mammography, mammography for women ≤ 35 years old, breast evaluation in women < 35 years old

Mammography is an essential component of the diagnostic triad of clinical examination, mammography, and fine-needle aspiration biopsy for evaluation of breast symptoms or findings in a woman.¹⁻⁴ However, the following question remains: How beneficial to breast evaluation and clinical management is mammography for women 35 years of age or younger?

The incidence of invasive breast cancer in women aged < 35 years is low (Table I).⁵ Compared with women aged 30-34 years, the incidence increases > 2 -fold for women aged 35-39 years, almost 5-fold for women aged 40-44 years, and 8-fold for women aged 45-49 years.

Multiple studies have questioned the value of mam-

mography for women < 35 years old. Williams et al⁶ reported on the mammograms of 76 patients aged 18 to 29 years. Thirty-four patients had palpable lesions, and 42 had no palpable mass. No other cancers were mammographically identified in either group. Overall, mammographic analysis judged the breast parenchyma to be 32% dense, 54% moderately dense, and 14% fatty. No definite correlation was noted between the mammographic visibility of a palpable mass and parenchymal density. Hall⁷ agreed with the conclusions of Williams et al⁶ and furthermore recommended preoperative mammography for all women (at any age) before surgical biopsy is performed. Lesnick⁸ reported a failure of mammography to demonstrate palpable cancers in $> 60\%$ of women ($n = 106$) < 45 years old. Treatment was delayed in 15 patients with "negative" findings on mammograms. The danger of delay in the diagnosis of breast cancer when clinicians receive a "negative" mammogram report was emphasized. Other studies report a 50% to 60% accuracy for the mammographic detection of breast cancer in women ≤ 35 years old.^{9, 10} In contrast, Meyer et al¹¹ documented the perception of a suspect mass in 90% of mammograms of women ($n = 31$) aged < 35 years with diagnosed breast cancer. The mammograms of this

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Table II. Initial mammographic recommendations by percentages for 5-year age groups (n =1908)

Age (y)	No.	No significant abnormality (%)	Ultrasonography (%)	Additional views (%)	Consider biopsy or fine-needle aspiration (%)	Biopsy (%)
31-35	609	49	29	18	4	0
26-30	636	56	29	9	4	2
21-25	450	41	46	>8	4	<1
≤20	213	21	66	<9	4	0

parenchyma), in comparison with 37% for women aged 30-35 years. Mammograms were judged to be of excellent quality for 29% of women with predominantly fatty breast tissue by mammography. Ultrasonography was performed in 38% of the entire group. Harris and Jackson¹⁵ performed retrospective analysis of the mammograms of 474 women aged 13-34 years referred for breast imaging. Of the 6 carcinomas confirmed by pathologic diagnosis, 3 were perceived as abnormalities by mammography; of the 3 that were not mammographically detected, 2 were described as "dense breast." Restriction of mammography in this age group to women with a palpable breast mass was recommended. Similar recommendations were put forth by Brand et al¹⁶ in reporting on 159 consecutive patients <35 years old who were referred for mammography (of whom 26% had a palpable mass).

Material and methods

From a total of 4160 initial mammograms taken during 1992-1995 of women with symptoms who came to the Women's and Children's Hospital Breast Diagnostic Center, Los Angeles County and University of Southern California Medical Center, 1908 were of women ≤35 years old. The 1908 initial mammogram reports were retrospectively reviewed, analyzed by the mammography recommendations, and stratified by age groups (Table II). During these years (1992-1995) there was no age restriction on obtaining mammograms on site in the diagnostic center. Mammograms were ordered for all symptomatic patients in the study's age group who did not have recent (within 1 year) mammogram films in hand for subsequent reading by the medical center's department of radiology mammography service. No other patients were excluded from the analysis of the study's age group and study period.

With few exceptions, the initial mammogram films (bilateral craniocaudal and mediolateral oblique views) were obtained on the same day that the patient was seen in the diagnostic center. The same technologist, using a mobile LORAD Transpo 350 (T-350) mammography unit, usually took the mammograms. The films were batch processed and read off site, usually by the same radiologist. The initial mammogram reports and diagnostic center charts are the basis of this analysis. Further indicated imaging (mammography and ultrasonography)

was performed at a later date and in another facility and is not part of this study analysis. The diagnoses and recommendations of final imaging reports (including breast ultrasonography, when performed) and the mammographic characteristics of the lesions perceived are the subject of a subsequent study.

The Women's and Children's Hospital Breast Diagnostic Center is a referral clinic within the Los Angeles County Health Service. Physician referrals account for 87% of new patient encounters. Almost all of the 13% self-referred patients sought diagnostic center evaluation for what they perceived to be a breast mass. A perceived palpable breast mass was the presenting complaint of 55% of the study group of the diagnostic center's new patients. About 80% of the patients were Hispanic. A staff (faculty) physician reviewed the resident physician's initial management plan before the mammogram reports were obtained but after the initial fine-needle aspiration cytologic impressions were available. After the mammogram reports were received, a staff physician reviewed each chart from the diagnostic center's study group to determine whether the initial mammogram reports had changed the management or diagnosis.

The initial mammogram requisition-report form used during the study period is illustrated in Fig 1.

As a referral (consultation) clinic, the diagnostic center is organized to completely evaluate (including ordered procedures and tests) a woman's breast problem. Fine-needle aspiration of a palpable breast mass and initial mammography is performed during the patient's initial visit. A staff (faculty) physician subsequently reviews the charts and test results, and if there are any changes, the patient is contacted by telephone. The patient is referred for ongoing care to specialists within the medical center or to her primary health care provider.

Results

The recommendations of the 1908 diagnostic center initial mammogram reports are listed in Table II by percentages for 5-year age groups. The breast diagnoses and management plan before and after the initial mammogram reports were compared for changes or variations. No fundamental changes in the diagnoses or management plans were noted after the initial mammogram reports were available and correlated with each case in the

study group. Once the patients came to the diagnostic center, no case of delay in the diagnosis of breast cancer occurred in the study group.

Fatty replacement of the glandular tissue of the breast as women age decreases the mammographic density seen when their mammograms are read. It is well known that the degree of mammographic density correlates with younger age (ie, the younger a woman is when she has a mammogram, the more likely it is that her mammograms will have density that interferes with the mammographic evaluation). In this study the increasing percentage of "no significant abnormality" (which implies a readable mammogram) and the decreasing percentage of the radiologist's recommendations for ultrasonography are consistent with less mammographic density as age advances (Table II).

From 1992 to 1995, 23 invasive cancers were diagnosed by the diagnostic center in women ≤ 35 years old. All the cancers were palpable, and a cytologic diagnosis of adenocarcinoma had been made by fine-needle aspiration before the initial mammography. Six of the cancers were in women ≤ 30 years old. Thus all known cases of cancer were palpable and suspect, highly suspect, or diagnostic of adenocarcinoma by fine-needle aspiration cytologic analysis performed on the date the patient was initially seen in the diagnostic center. The use and application of the initial mammogram reports in this study did not avoid any open surgical biopsies. The patients with cases diagnosed by fine-needle aspiration and those with suspect findings were seen in the medical center's breast surgery clinic within 5 working days of the initial visit to the diagnostic center.

Comment

The incidence rate of invasive breast cancer is about 40% lower in Hispanic than white women by California statistics.¹⁷ Because about 80% of the women in the study group are Hispanic, the expected number of invasive cancers would be less than in other populations. Furthermore, the medical center's general surgery service holds 2 tumor (breast) clinics a week, and most women with clinically apparent breast cancer are referred by their physicians directly to the breast surgery clinics. Thus the population of women seen in the diagnostic center is a selected group of young Hispanic women that does not represent the general population.

The youngest woman with invasive breast cancer diagnosed in the diagnostic center was 22 years old.

No clinically unsuspected invasive breast cancers were perceived by initial mammographic evaluation in the diagnostic center among the age group ≤ 35 years. Bassett et al¹⁴ reported a similar experience in 1016 women < 35 years old.

Mammographic density did not preclude the initial mammographic impression of "no significant abnormal-

ity" in 47% of the group of women ≤ 35 years old. On the basis of the initial mammogram impression, ultrasonography was recommended by the radiologist for 37% of this age group.

According to the recommendations of the American College of Radiology,¹⁸ the current policy of our radiology department's mammography service is routine acceptance of requests for diagnostic mammography of women ≥ 30 years old. Exceptions to this policy can be achieved by direct personal request from the faculty of the diagnostic center to the chief of the mammography service. Annual screening mammography of women without symptoms is recommended beginning at age 40 years.¹⁹

Among the population served and in the clinical setting of the diagnostic center, mammography did not make a clinically meaningful contribution to the evaluation and management of presenting breast symptoms or findings in the group of women ≤ 35 years old. Thus mammography of women who had symptoms in the study age group was not of clinical benefit; it consumed valuable limited resources, and it was not cost-effective in the diagnostic center's population and clinic setting.

The current policy of the diagnostic center is to order diagnostic mammography of all new patients ≥ 30 years old who do not have recent (taken within 1 year) mammograms in hand. This policy is consistent with the recommendations of the American College of Radiology¹⁸ and the current protocol of the department of radiology's mammography service. In contrast, during this mammography study period, there was no age restriction: Diagnostic mammography was performed on all patients coming to the diagnostic center. The results of this study support the current mammography policy of the diagnostic center.

Diagnostic mammography is ordered for patients of any age when the clinical impression (usually confirmed by prior fine-needle aspiration) is invasive breast cancer. In the diagnostic center the policy of performing fine-needle aspiration on all palpable breast masses at initial evaluation is being continued.

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Editors' note: This manuscript was revised after these discussions were presented.

Discussion

DR LORNA A. MARSHALL, Seattle, Washington. Drs Hindle and Davis and Ms Wright have reported the findings of 1908 consecutive mammograms obtained from women ≤ 35 years old who came to their breast diagnostic center with breast symptoms or a palpable breast mass. In no cases did the mammography findings contribute to the diagnosis or clinical management of the patient's case.

The possible overuse of mammography in younger age groups has been discussed in the radiology literature for several years. In Dr Hindle's clinic, 45% of the diagnostic mammograms were obtained from women aged ≤ 35 years old in the 1992-1995 period. One British author estimated that two thirds of patients coming to breast clinics in Great Britain are < 35 years old, whereas only 3% of breast cancers are in this same age group. A community survey in North Carolina found that as many as 25% of women in their 30s had ever had a mammogram, but only 37% of women aged 70-74 years had ever had a mammogram. Younger women were found to be more worried about breast cancer than older women,

and many of them believed that their risk was higher than that of older women. The authors of this survey suggested that our efforts to educate the public on the need for mammograms may have targeted and been successful in the wrong age group.

Several previous reports have examined the usefulness of mammography in this age group. None have demonstrated that mammography findings altered clinical management, except perhaps to stimulate repeated mammograms, recommend ultrasonography or biopsy because of unclear findings, or increase the duration of follow-up. In some studies mammograms identify as few as 40% of palpable breast cancers in this younger age group. Negative mammograms may falsely reassure patient and physician and have been reported to lead to a delay in the diagnosis of breast cancer in this age group. The risk of radiation-induced malignant changes with current techniques is small but is expected to be higher in the young glandular breast than in the older screened population. Finally, the cost of a procedure with no benefit cannot be justified.

In the context of other studies, Dr Hindle's is extremely important because it is by far the largest. It evaluates almost twice as many mammograms as the next largest study. Other reports have evaluated 76, 159, 625, and 1016 mammograms. His conclusions should discourage the unnecessary use of mammograms in this age group.

In closing, I have 3 questions for Dr Hindle. First, on the basis of your data, are there *any* indications for mammography in women ≤ 35 years old with breast symptoms or a palpable mass? Second, what do you believe are the indications for breast ultrasonography in this same group of women? Third, given the widespread fear of breast cancer in all age groups, how can we best reassure our anxious younger patients who have symptoms when we do not use objective information such as mammography?

DR MALCOLM L. MARGOLIN, Los Angeles, California. Can you please comment on what you advise for the woman with a strong family history but who is free of symptoms as to age of first mammography and follow-up? Further, please comment on any ancillary or additional testing that you would do in this person.

DR S. GAINER PILLSBURY, JR, Long Beach, California. Occasionally, even in older women, when mammography is definitely indicated, a report will be made of "very dense breasts," which reduces the sensitivity and validity of the interpretation. How should those women be followed up? Should all those patients be referred for ultrasonography or additional imaging procedures?

DR MARK D. NICHOLS, Portland, Oregon. Could you comment on incorporating ultrasonography as part of a triple-screening test for evaluation of masses in women < 35 years old?

DR ENRIQUE C.M. DECASTRO, Portland, Oregon. Before the advent of managed care, it was not infrequent to obtain a mammogram at age 35 years and then to obtain another one at age 40 and every 2 years afterward. Managed care has altered this sequence, suggesting that

the first mammogram be obtained at age 40. Is a baseline mammogram no longer necessary at age 35?

DR HINDLE (Closing). I thank Dr Marshall and all the Fellows for your pertinent questions. I am keenly pleased with the show of interest in this topic, which is of concern to all of us as obstetrician-gynecologists. Moreover, all of us as individual persons are concerned because we either know or will know women who themselves have breast cancer or who have relatives and friends with breast cancer. Physicians are looked on as the source of accurate medical information. Patients and their relatives will come to you seeking advice. Thus we all need to have a solid background and basic understanding of breast cancer, how it is appropriately diagnosed, and how it can be treated. Mammography is critically important in the diagnosis and outcome because it is the only effective method of identifying nonpalpable cancers, which have the best prognosis when treated.

I will begin with the question of my formal discussant, Dr Marshall, who asked whether there are any indications for mammography in women ≤ 35 years old with breast symptoms or a palpable mass. On the basis of our data, mammography is indicated, at any age, in clinically suspected breast cancer. Mammography is essential in the evaluation of suspected or diagnosed breast cancer. For an appropriate treatment plan, it is necessary to know about any additional unsuspected (nonpalpable) lesions, the size of the lesion in question, and the entire other breast. So we continue to obtain mammograms of women < 35 years old when we have a high suspicion of cancer by clinical examination.

Dr Marshall also asks our indications for breast ultrasonography. We use this in our clinic as a teaching device and for ultrasonography-guided aspiration (eg, of a cyst or abscess). We also use ultrasonography for tissue core-needle biopsy of a palpable mass when we are unable to establish a cytologic diagnosis by fine-needle aspiration.

Generally, breast ultrasonography is an adjunct to mammography and is not an appropriate screening procedure. Ultrasonography is just as effective in the breast as in the ovary for distinguishing a cyst from a solid mass. It is the only modality, other than mammography, available to radiologists that has proven clinical practice value. Contrast-enhanced magnetic resonance imaging, computed tomography scans, positron emission tomography scans, single-photon emission imaging, computed tomography scans, and similar procedures remain investigational in the diagnosis of breast disease. If one diagnostic tool, in this case a mammogram, is not working perfectly and producing clear-cut results, radiologists will frequently recommend ultrasonography. However, I have not seen a published study on the value of that type of adjunctive ultrasonography in clinical practice. Breast ultrasonography is a locally focused, intensely operator-dependent procedure. So there has to be a mammographically identified specific place in the breast to be evaluated by ultrasonography. With a palpable mass, there are other procedures for that purpose (eg, fine-needle aspiration or tissue core-needle biopsy).

Ultrasonography may be clinically useful as an ad-

adjunct to mammography, but in following the published medical literature, I have not seen its effectiveness analyzed or documented. So I do not know what contribution it can make to breast imaging diagnosis. When I go to radiology meetings about breast ultrasonography, the usual talk is about distinguishing a cyst from a solid mass. With a palpable mass, our approach is to diagnose the mass with a 22-gauge needle. Then we immediately know whether the mass is a cyst that can be therapeutically drained by aspiration. Thus I do not order ultrasonography of a palpable mass in any age group. The most important procedure is the clinical breast examination to identify a palpable mass. That is what we do for our breast evaluation in this age group. In our practice we have found that a thorough breast-oriented history and bilateral clinical breast examination provide an adequate basis for reassuring young women that they have no clinical evidence of breast cancer.

Dr Margolin asks about the family history as a variable in ordering screening mammography. Our protocol is to begin screening mammography 10 years before the age that breast cancer was diagnosed in a first-degree relative. Therefore, if breast cancer was diagnosed in the mother at age 42 years, we would begin annual screening mammography of the daughter at age 32. Otherwise, we begin annual screening mammography at age 40 for all our patients.

Dr Pillsbury asks about mammographically dense breasts in this age group and the indications for ultrasonography. In our study mammographers frequently recommended ultrasonography in this young age group or sometimes in any age group. I do not know its effectiveness in that situation because a specific location in the breast must be imaged. Viewing increased mammographic density of the breast is like looking through fog. The density tends to be over the entire breast, which makes it difficult to perform a focused examination. I have attended meetings on breast ultrasonography in Europe, where some physicians are incredibly dedicated to ultrasonographic evaluation of the breast and spend their entire professional careers personally performing the ultrasonography. They have superb equipment, far beyond the capacity of most ultrasound equipment available in clinical practice here in the United States. They can do marvelous things, but these are devoted, talented persons with special equipment. I have not seen a wide-spectrum study where the typical radiologist here in this country could produce anything like the results of these few European specialists in breast ultrasonography. I am not enthusiastic about ultrasonography of the breast, but many radiologists are because that is the only other procedure they have to recommend for breast evaluation.

Dr Nichols asked about the appropriateness of using ultrasonography instead of mammography in the triple test (diagnostic triad) in the study age group and about "baseline" mammograms. Such a policy of ultrasonography in lieu of mammography for young women has been recommended by others and, in fact, has been implemented in some institutions. However, the problem remains that ultrasonography of the breast is not an effec-

tive screening examination. Mammography has been proved to be effective in screening for nonpalpable lesions of the breasts. Many of you can remember that there used to be screening ultrasonography that used breast immersion waterbaths and specialized equipment. It was very cumbersome and was not very effective. The American College of Radiology does not recommend ultrasonography for screening of the breasts. Again, there needs to be a specific focused area in the breast for indicated ultrasonographic evaluation. Many of us are old enough to remember that the recommendations for mammography began with a "baseline mammogram at age 35." There is nothing magical about that age. It was just the first mammogram, and the age indication was totally arbitrary. To my knowledge, that baseline recommendation was not based on any pertinent data, incidence curves, or any other objective information. In the past 5 or 6 years, there have been several great debates in this country about whether it is worthwhile to obtain screening mammograms at ages 40-49 years; at that time there were no published statistically significant data that validated the same sort of lowering of the breast cancer mortality rate that had been demonstrated in the

Swedish 2-county study of Dr Tabar. There are now published studies of clinical trials specifically designed to answer that question. Two Swedish studies validate, with statistically significant data, that in the age group from 40 to 49 years the breast cancer mortality rate can be lowered by at least 40% by doing population-based screening mammography. This is now clear to almost everyone—even the Canadians, who became enthusiastic about breast self-examination and clinical breast examination by specially trained nurses in lieu of mammography to screen for breast cancer in women <50 years old on the basis of their epidemiologic studies. Now most breast specialists all over the world agree that annual screening mammography should begin at age 40 years.

The mammography in our study data was not really cancer screening because all the women had breast symptoms or findings. Therefore our mammograms were technically the beginning of diagnostic mammography, but because we did not have total diagnostic mammography capability (eg, spot compression or magnification views) available within our clinic, we were using the same views initially (bilateral craniocaudal and mediolateral oblique) as those used for screening mammography.