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Incremental clinical value of ultrasound in men with mammographically confirmed gynecomastia

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ABSTRACT

Purpose: To determine whether ultrasound is of any value in male patients presenting with focal symptoms who have classic features of gynecomastia but no concerning findings on mammography.
Materials and Methods: Over a 3-year period, all male patients who underwent mammographic evaluation were identified in this retrospective study. Patients with a mammographic diagnosis of gynecomastia and subsequent breast ultrasound at a large tertiary academic medical center comprised the study cohort. Men whose ultrasound diagnosis differed from the initial mammographic evaluation were analyzed for both additional benign findings as well as findings that warranted biopsy.
Results: A total of 353 mammograms were obtained from 327 unique patients (ages 18–95, mean 51 years). Of all mammographic examinations, gynecomastia was the sole finding in 73% (259). In those 259 studies, 85% were further evaluated with ultrasound, in which 6 (2.7%) showed additional benign findings, and 4 (1.8%) showed suspicious findings for which biopsy was recommended. No malignancies were detected in those patients. Furthermore, no malignancies were detected in patients whose mammogram revealed only normal fatty parenchyma or only gynecomastia. In all cases of cancer, mammography revealed visible masses.
Conclusion: Judicious use of breast ultrasound in men improves outcome. Our data suggest that targeted ultrasound is of limited value in symptomatic male patients where mammography is negative or reveals only gynecomastia and leads to unnecessary benign biopsies in these patients. When mammography reveals concerning findings, ultrasound adds positively to clinical management.

1. Introduction

Imaging evaluation of a male patient with a palpable abnormality or focal breast pain is variable among institutions and entails mammography alone or in combination with ultrasound (US). Gynecomastia is the benign proliferation of glandular tissues in the male breast and is the most common condition of the male breast. It is most prevalent in the newborn, adolescent, and the elderly [1–3]. It comprises up to 80% of all referrals of men to breast centers in the United States [2]. Gynecomastia is largely caused by alterations in the testosterone-to-estrogen ratio, which can arise from liver disease, hypogonadism, exogenous hormone use, or functional endocrine tumors. It is also associated with numerous medications such as antidepressants, anti-hypertensives, glucocorticoids, and chemotherapeutic agents.

Male breast cancer is an uncommon malignancy that can produce significant anxiety in men. It is estimated to comprise 1% of all breast cancers [4]. Despite the low incidence of male breast cancer, symptoms such as a palpable lump, focal pain, or tenderness can create significant anxiety in patients. The initial assessment for male breast symptoms includes detailed history and physical examination to identify worrying features before referral for imaging. Although American College of Radiology recommends ultrasound for the evaluation of breast-related symptoms in women regardless of mammographic findings, the role of ultrasound in male patients with benign findings on mammography has not been established [5]. Some radiologists recommend the judicious use of combined mammography plus ultrasound only on men with concerning symptoms such as nipple discharge [6], recommending a unimodal approach in men with ambivalent physical findings [7]. In our experience, breast imaging centers have approached the male breast differently: some appropriate imaging based on physical examination, while others generalize existing

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female breast guidelines and utilize both mammography and ultrasound for all symptomatic men.

Finally, as accountable care organizations (ACO) become an increasingly prominent mode of care delivery, elucidating the benefits of additional imaging and eliminating unnecessary studies also become salient dimensions of research [8]. The goal of this study was to determine the incremental value of breast ultrasound in male patients with a clinical concern and a mammographic diagnosis of gynecomastia.

2. Methods

Institutional Review Board approval was obtained for this study before any patient information was obtained, and informed consent from patients was not required. Using the radiology information system at our institution, a tertiary care academic medical center, the authors retrospectively analyzed all consecutive mammographic examinations of male patients between January 2007 and December 2009. Imaging interpretation is made by our breast imaging department, staffed by eight fellowship-trained breast radiologists and two non-fellowship-trained radiologists, with experience ranging from 4 to 20 years.

Men with known prior breast cancer were excluded. All patients were first examined by a clinician for one or more breast-related complaints (palpable lump, asymmetric enlargement, tenderness, nipple discharge), and then referred for imaging evaluation. The radiology reports of the mammographic examinations were reviewed for the specific diagnosis and BI-RADS categorization. In each patient's radiology report, demographic information such as age and risk factors were noted in addition to parenchymal density and significant imaging findings. Clinical and/or imaging follow up was obtained for each study patient for 2 years after the initial imaging study.

Dedicated mammography units were used for all mammographic imaging (General Electric Senographe Essential, http://www.gehealthcare.com/), and corresponding dedicated mammographic workstations were used for interpretation (General Electric Senographe 2000D, http://www.gehealthcare.com/). For all mammographic examinations, craniocaudal and mediolateral oblique views were obtained with additional imaging with magnification, spot compression, or tangential views at the discretion of the interpreting radiologist. All mammograms were interpreted in accordance with the American College of Radiology Breast Imaging Reporting and Data System (BI-RADS) classification system [9]. Gynecomastia was evaluated using a method consistent with that described in the literature [10,11]. Specifically, gynecomastia was defined as the visualization of glandular breast tissue radiating out from beneath the nipple into surrounding tissue without associated mass or associated distortion. Gynecomastia classified using the BI-RADS lexicon with regard to descriptors and final assessment categories (BI-RADS Category 2).

For 312 of 374 mammograms (83.4%), a focused ultrasound examination was also performed, usually by the same physician who interpreted the mammogram. The ultrasound was performed on the same day as the mammogram for most patients ($n = 276$) and within seven-days for all patients reviewed in this study. Ultrasound was performed on Philips iU22 units with the use of a 12.5–17 MHz linear transducer.(Philips Healthcare, Andover, MA). All ultrasound examinations were performed with the patient in the supine or supine oblique position on the examination table. Primary breast cancer was identified using findings consistent with that described in literature [12].

The authors also searched the electronic medical records system which recorded all breast fine-needle aspirations (FNA) or core-needle biopsies performed during this 3-year period.

Table 1
Most common findings on mammography in symptomatic male patients.

Diagnosis	Cases	% of total
Fatty parenchyma		
and normal	43	12
with lymph node	2	<1
with lipoma	7	2
with mass not lipoma	18	5
with other findings	7	2
Gynecomastia		
alone	259	73
with lymph node	7	2
with lipoma	4	1
with mass not lipoma	3	<1
with density or asymmetry	3	<1
Total	353	100

Pathology reports were reviewed for all men whose radiologic evaluation led to a FNA or core-needle breast biopsy. The data were recorded and archived in a locally-stored, protected computer database. The mean age, frequency of gynecomastia, masses, and utilization of ultrasound was calculated using Statistical Analysis System version 9 (http://www.sas.com/).

3. Results

A total of 374 mammograms were reviewed in this study. Twenty-one (21) mammographic and four (4) ultrasound exams were obtained for follow-up after prior mastectomy of cancer in otherwise asymptomatic men and were excluded from the study. Therefore, the study cohort consisted of 353 mammograms (Table 1), along with 308 corresponding ultrasound examinations.

Of the 353 mammograms obtained from 327 patients (ages 18 to 95, mean 51.0 years, standard deviation 16.5 years), 77 (22%) showed fatty breast parenchyma, and 276 (78%) revealed gynecomastia. Of the 77 which showed fatty parenchyma, 43 (56%) revealed no other findings. Of the remaining 34, 27 (79%) included visualized masses, 3 focal asymmetries, and 1 case each of suspicious calcifications, dermal calcifications, abscess, and skin thickening. The 27 cases of mammographically visualized masses with fatty parenchyma consist of 7 cases of lipomas, 2 lymph nodes, and 18 that required ultrasound for further evaluation. Ultrasound examination in these 18 cases revealed 1 negative examination, 1 case of infected sebaceous cyst, 1 case of lipoma, and 15 solid masses. Seven (7) of the 15 masses were deemed suspicious in appearance and underwent biopsy, with 2 cases revealing invasive ductal carcinoma (Fig. 1). Table 2 details the mammography, ultrasound, and biopsy findings for each case which resulted in a biopsy.

In the 276 mammographic examinations that included gynecomastia, 259 (94%) had no additional mammographic findings. Ultrasound was recommended and performed in 221 (85%) of those 259 cases. In 211 (95.5%) of the 221 studies, ultrasound findings were in agreement with mammography and revealed no additional findings other than the gynecomastia (Fig. 2). The additional ultrasound findings were benign for 6 of the other 10 out of 221 cases (Fig. 3), but four cases prompted a recommendation of biopsy (Table 3). Two of the four patients returned for core-needle biopsy, which revealed benign breast tissue (Fig. 4). In one patient, the suspicious lesion spontaneously resolved one week later when he returned for biopsy. The fourth patient did not return for biopsy; medical records show that his primary care physician favored infectious sebaceous cyst as the mass resolved after draining "pus." Table 3 details the additional ultrasound findings and biopsy results. No malignancies were detected when gynecomastia was the only mammographic finding.