

Changes in Surgical Management Resulting From Case Review at a Breast Cancer Multidisciplinary Tumor Board

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Received July 10, 2006; accepted August 21, 2006.

BACKGROUND. The treatment of breast cancer requires a multidisciplinary approach, and patients are often referred to a multidisciplinary cancer clinic. The purpose of the current study was to evaluate the impact of this approach on the surgical management of breast cancer.

METHODS. The medical records of 149 consecutive patients referred to a multidisciplinary breast cancer clinic over a 1-year period with a diagnosis of breast cancer were reviewed retrospectively for alterations in radiologic, pathologic, surgical, and medical interpretations and the effect that these alterations had on recommendations for surgical management.

RESULTS. A review of the imaging studies resulted in changes in interpretations in 67 of the 149 patients studied (45%). This resulted in a change in surgical management in 11% of patients. Review of the pathology resulted in changes in the interpretation for 43 of the 149 patients (29%). Thirteen patients (9%) had surgical management changes made solely as a result of pathologic reinterpretation. In 51 patients (34%), a change in surgical management was recommended after discussion with the surgeons, medical oncologists, and radiation oncologists that was not based on reinterpretation of the radiologic or pathologic findings. Overall, a second evaluation of patients referred to a multidisciplinary tumor board led to changes in the recommendations for surgical management in 77 of 149 of those patients studied (52%).

CONCLUSIONS. The changes in management stemmed from differences in mammographic interpretation, pathologic interpretation, and evaluation by medical and radiation oncologists and surgical breast specialists. Multidisciplinary review can provide patients with useful additional information when making difficult treatment decisions. *Cancer* 2006;107:2346-51. © 2006 American Cancer Society.

KEYWORDS: breast neoplasms, multidisciplinary, referral, consultation, breast conservation, mastectomy.

The contemporary treatment of breast cancer has increased in complexity and combined modality therapy has become the standard of care. A multidisciplinary tumor board recognizes the essential need for multimodality treatment in a single-center setting. With the advent of the Internet and increased patient knowledge and awareness, patients often seek care from a specialized cancer center. In recent years, there has been a trend toward patient evaluation at centers that employ a network of specialists devoted to the care of patients with breast cancer.

The National Cancer Institute has long provided funding for comprehensive centers with multidisciplinary treatment options. Professional organizations such as the American Society of Breast

Diseases and the American Society of Clinical Oncologists widely support such centers. At our institution, patients diagnosed at outside hospitals are often referred with the diagnosis of breast cancer for second opinions. In some cases, complete care of the patient is assumed, whereas in other cases the patients return to their outside physicians. We sought to examine our experience with patients evaluated at our breast tumor board and to determine the impact this had on the surgical recommendations compared with those received prior to review by the multidisciplinary tumor board.

MATERIALS AND METHODS

Breast Cancer Multidisciplinary Tumor Board

Patients were referred to the breast center's multidisciplinary tumor board after having already been diagnosed with breast cancer. All patients in this study had undergone an initial evaluation, breast imaging and interpretation, biopsy, and recommendations for treatment at outside facilities, and had presented for second opinions. Patients are routinely instructed by our clinical nurse specialist to have all mammograms, ultrasound images, and pathology slides forwarded prior to the first clinic visit, or to bring these items with them. Referring physicians were requested to forward all medical records and official readings prior to the consultation.

On the morning of evaluation, each patient underwent a thorough history and physical examination by the surgical team. All imaging was submitted to the breast radiologists for interpretation and the specimen slides were submitted to the pathologists for review. The entire team of surgeons, oncologists, radiologists, pathologists, radiation oncologists, and nurses then met in consultation to discuss each patient. Treatment plans were made based on the National Comprehensive Cancer Network's (NCCN) most current clinical guidelines for breast cancer.¹ Patients often required further diagnostics, including additional imaging studies and/or additional histologic staining. Breast magnetic resonance imaging was not part of the additional imaging. These tests were completed at our center, with the results reviewed the same day or at the next tumor board meeting.

During the tumor board meeting, patients had educational meetings with the clinical nurse specialists, at which time they received materials and readings concerning breast cancer treatment options. They also received information from social workers and psychologists during this session. Prior to completion of the day, the patients then met with the involved physicians individually and the treatment plan was discussed. They had the opportunity to ask questions and have one-on-one consultations with all

TABLE 1
Radiologic Interpretation Changes after Review (n = 149)

| Change in management | No. | % |
|--|-----|------|
| Additional lesions | 43 | 28.9 |
| Residual abnormality after surgery | 6 | 4.0 |
| Increased or decreased suspicion of lesion | 18 | 12.1 |
| Total | 67 | 45.0 |

involved physicians. Follow-up appointments and/or bookings for surgery, chemotherapy, or radiation planning were made at the time of the initial visit for those patients who opted to transfer their care. Full details of the tumor board recommendations were communicated back to the outside physicians for those patients who came for a second opinion only.

The records of 149 consecutive patients referred to the multidisciplinary tumor board for a second opinion over a 1-year time period between July 2000 and June 2001 were reviewed retrospectively. Patients without an outside treatment recommendation were excluded from the study, as were patients initially diagnosed at the University of Michigan. With the approval of the Institutional Review Board, the records for these patients were retrospectively reviewed for alterations in radiologic, pathologic, surgical, and medical interpretations and the effects that these alterations had on recommendations for surgical management and clinical treatment were examined.

RESULTS

Review of Outside Imaging

Review of the outside imaging by dedicated breast radiologists resulted in changes in previous interpretations in 67 of the 149 patients studied (45%). The most common change was the identification of additional lesions. Overall, 43 patients (29%) were recommended to undergo an additional biopsy or an alteration in follow-up imaging. Six patients had residual findings at the site of a previous excision (4%), and 18 patients (12%) had a change in the level of suspicion in a previously noted lesion (Table 1).

Based on review of imaging and additional studies obtained at our institution, a change in the follow-up was suggested for 10 patients (7%). Twenty-four patients underwent biopsies of second lesions or excision of residual lesions. Of the patients undergoing these additional procedures, 12 (50%) had benign findings, 8 (33%) demonstrated additional or residual cancer, and 4 patients (17%) underwent their biopsy at another center for which the results are unknown. In all, 16 of 149 patients (11%) had a change in surgical management made based on rereview of the breast imaging:

TABLE 2
Changes in Surgical Management Based on Review of Breast Imaging (n = 149)

| Change in management | No. | % |
|---|-----|------|
| Second cancer detected after biopsy of additional lesion, precluding BCT | 8 | 5.4 |
| Reexcision lumpectomy for residual calcifications noted on postlumpectomy mammogram | 3 | 2.0 |
| Mammographic findings precluding recommended BCT | 2 | 1.3 |
| Neoadjuvant chemotherapy recommended instead of mastectomy | 2 | 1.3 |
| ALND recommended | 1 | 0.7 |
| Total | 16 | 10.7 |

BCT indicates breast-conserving therapy; ALND, axillary lymph node dissection.

TABLE 3
Pathologic Interpretation Changes after Consultation (n = 149)

| Change | No. | % |
|---------------------------------------|-----|------|
| Downgrade to benign disease | 6 | 4.0 |
| Upgrade from benign disease to cancer | 2 | 1.3 |
| Upgrade from DCIS to invasive cancer | 1 | 0.7 |
| Change in tumor grade or subtype | 26 | 17.4 |
| Change in surgical margin status | 8 | 5.4 |
| Total | 43 | 28.8 |

DCIS indicates ductal carcinoma in situ.

8 patients as a result of the additional biopsies and 8 patients based on radiographic review alone (Table 2).

Review of Outside Pathology

Review of the histologic slides by dedicated breast pathologists resulted in changes in the interpretation for 43 of 149 patients (29%). Six patients (4%) originally diagnosed with ductal carcinoma in situ (DCIS) had their diagnoses changed to lobular carcinoma in situ and/or atypical ductal hyperplasia. One patient was upgraded from benign disease to cancer and 2 patients had their diagnoses changed from DCIS to invasive disease. Twenty-six patients (17%) had changes in tumor grade or subtype, and 8 patients (5%) had changes to the surgical margin status as a result of consultation with pathologists during the multidisciplinary tumor board (Table 3). This resulted in a change in surgical management for 13 patients (9%), solely as a result of pathologic reinterpretation (Table 4).

Clinical Review by the Multidisciplinary Tumor Board

Case review at the tumor board led to changes in the recommended surgical management that were not based on the interpretation of the radiologic or pathologic findings in 48 patients (32%), but rather based on NCCN guidelines as interpreted by the surgeons,

TABLE 4
Changes in Management Based on Review of the Pathology

| Change in management | No. | % |
|---|-----|-----|
| No further surgery needed (cancerous lesion actually benign) | 2 | 1.3 |
| Axillary LN evaluation not recommended (invasive cancer actually in situ) | 1 | 0.7 |
| Axillary LN evaluation recommended (in situ cancer actually invasive) | 1 | 0.7 |
| Reexcision lumpectomy recommended (negative surgical margins actually positive) | 5 | 3.3 |
| Adjuvant chemotherapy recommended (change in tumor grade) | 4 | 2.7 |
| Total | 13 | 8.7 |

LN indicates lymph node.

TABLE 5
Changes in Recommended Surgical Management after Tumor Board Review

| Change in management | No. | % |
|---|-----|------|
| Candidate for breast conservation recommended for mastectomy | 5 | 3.4 |
| Recommended for breast conservation but not an appropriate candidate | 2 | 1.3 |
| Sentinel LN biopsy recommended rather than ALND or no axillary LN evaluation | 19 | 12.8 |
| ALND recommended for positive sentinel LN or clinical evidence of axillary LN disease | 8 | 5.4 |
| Reexcision lumpectomy recommended for close surgical margins | 3 | 2.0 |
| Neoadjuvant treatment recommended rather than mastectomy | 11 | 7.4 |

LN indicates lymph node; ALND, axillary lymph node dissection.

radiation oncologists, and medical oncologists only (Table 5). In some cases, this represented a difference in the management approach. Five patients were recommended by outside surgeons for mastectomy but had no contraindications to breast conservation. Two patients were recommended for breast conservation but were not candidates for adjuvant radiation. The multidisciplinary tumor board recommended that 19 patients undergo a sentinel lymph node (SLN) biopsy. In the majority of these patients, this was because the outside surgeon recommended axillary lymph node dissection (ALND) for staging. In some cases, surgical changes were made based on findings at physical examination, specifically the identification of clinically palpable axillary lymph nodes for which ALND was recommended after confirmation by fine-needle aspiration.

In some cases, the changes were made based on our approach to breast cancer treatment. Eleven patients initially were recommended to undergo a mastectomy; however, after review at the tumor board, our

recommendation was for neoadjuvant chemotherapy with a possible attempt at breast conservation therapy. Three patients were recommended to undergo a reexcision lumpectomy based on our management of surgical margins measuring <2 mm.

When the changes in recommendations based on the radiologic, pathologic, and clinical reviews were combined, a total of 77 of the 149 patients evaluated (52%) had ≥ 1 changes in recommendations for surgical treatment. This group included 11 patients who had changes in ≥ 1 area of evaluation.

DISCUSSION

In 1985, the University of Michigan Medical Center established a multidisciplinary breast care center to provide comprehensive diagnosis and treatment for women with both benign and malignant disease.² The National Breast Cancer Coalition has defined a comprehensive multidisciplinary program as one that includes general breast and reconstructive surgery, hormonal therapy, chemotherapy, imaging, radiation oncology, clinical trials, and complementary and alternative therapies, as well as physical, mental, and emotional support. Administrative duties such as scheduling, billing, and record keeping are also integral parts of an established program. Other advantages such as high-risk genetics counseling and assessment, lymphedema services, and transportation programs have proved invaluable in the complete care of breast cancer patients.

Although many centers have long utilized tumor boards for other cancers, there are several clear factors supporting the treatment of breast cancer by a multidisciplinary tumor board. The most obvious advantage is the opportunity to review the results of radiology and pathology. There is known variability in radiologists' interpretation of mammograms,³ and specialists in breast imaging tend to detect more abnormalities compared with general radiologists.⁴ It is suspected that these results are likely due both to training and continuing specialty education in mammography, and the volume of mammographic interpretation. Expert breast pathology assessment is also becoming essential in breast cancer. Our results coincide with other national reports in which specialist review led to the reclassification of pathologic findings. Staradub et al.⁵ examined how often the pathologic second opinion resulted in changes in the surgical management and diagnosis. They found that specialty pathology review provided additional prognostic information in 40% of those cases studied and that major changes in pathology led to altered surgical therapy in 7.8% of patients. This is likely due in part to the consistent standards and boundaries set

by breast specialty groups of pathologists with regard to grading and types of cancers. The findings of both the current study and others suggest that expert radiology and pathology assessment is necessary in the routine treatment of breast cancer.^{4,6,7}

Another significant advantage at the forefront of the multidisciplinary breast cancer tumor board is the ability to disseminate new research findings and treatment strategies. This includes not only new systemic therapies and regimens, but also surgical management. SLN biopsy for surgical staging, downstaging tumors for breast conservation by means of neoadjuvant chemotherapy, and immediate reconstruction after skin-sparing mastectomy are relatively newer surgical concepts. Even breast conservation therapy, the safety of which was demonstrated in randomized trials more than 25 years ago,⁸⁻¹⁴ is still not applied uniformly.¹⁵ The incorporation of new treatment modalities requires the input of not just the surgeon but also the radiation oncologist (who must feel comfortable delivering radiation after lumpectomy or may recommend radiation after mastectomy) and the medical oncologist (for whom the staging information may change the management of the patient or who must assess the patient's suitability for systemic therapy). The basis for these medical decisions must reflect outcomes and clinical trials data and requires broad input across several disciplines.

In the current study, several patients who were candidates for breast conservation initially had been recommended to undergo mastectomy. Nationally, breast conservation is often underutilized. Examining the Surveillance, Epidemiology, and End Results (SEER) registry data from the National Cancer Institute, Lazovich et al. studied the frequency of breast-conserving therapy in different areas of the U.S. over the course of 11 years (1985-1995).¹⁶ They found that increasing age, Stage II disease, decreasing median income, decreasing educational level, and residence outside the region's major medical center all were factors predictive of an increased probability of treatment with mastectomy.

Although many patients may not require mastectomy, the key to successful breast conservation is the appropriate selection of patients. Patients with multicentric disease or diffuse microcalcifications are poor candidates, and the current data revealed several incidences in which biopsy of additional lesions demonstrated multicentricity or review of the mammography demonstrated diffuse microcalcifications that precluded breast-conserving therapy. Reexcision for positive surgical margins or residual calcifications was recommended in 8 patients. Postlumpectomy mammograms to detect residual clinical disease in patients who had microcalcifications will do so in a significant number of patients

and their routine use is recommended, even when negative surgical margins are obtained.^{17,18} In some patients, we recommended reexcision for close (<2 mm) margins. This may represent a more aggressive approach at our institution; other surgeons may perceive close but negative surgical margins as margins that do not require reexcision. To our knowledge, the definition of "close" surgical margins varies among institutions, and the effect of reexcision on local recurrence remains unknown; however, several reviews have demonstrated a higher local recurrence rate with close surgical margins.¹⁹⁻²¹

SLN biopsy has become increasingly accepted in the staging of the axilla for breast cancer and is now routinely performed in most large medical centers. The NCCN currently considers patients newly diagnosed with invasive breast cancer who are without prior chemotherapy or hormonal therapy to be candidates for SLN biopsy for surgical axillary lymph node staging. Although many large prospective trials have confirmed its accuracy and safety, to our knowledge SLN biopsy has not yet been widely accepted in many community-based and rural settings. For example, in a survey of rural surgeons in Kentucky, 87% performed breast cancer surgery yet only 54% performed SLN biopsy.²² In the current study, 27 patients (18%) had changes in their axillary lymph node management recommended. Many of these cases, noted among patients evaluated between 2000 and 2001, centered on the use of SLN biopsy in clinically lymph node-negative patients. As the results of randomized studies are published and more surgeons are trained in the technique of SLN biopsy, this should become a less frequent occurrence.

Over the past decade, neoadjuvant chemotherapy has also become more common. It has been shown that preoperative chemotherapy substantially reduces the size of the primary tumor and lymph node metastases in up to 80% of patients, often rendering these patients candidates for breast conservation therapy.²³ Several multiinstitutional randomized trials have demonstrated an increase in breast conservation rates after neoadjuvant chemotherapy.²⁴⁻²⁸ Thirteen patients (9%) in the current study had their management changed to include neoadjuvant chemotherapy based on surgical opinion and input from radiology and medical oncology specialists.

As with all retrospective reviews, the current study has limitations. The final recommendations from the tumor board were based on the best judgment of the involved physicians for each patient. Although the overall goal of the multidisciplinary team is to follow standard NCCN guidelines, physician preference and opinions may influence decisions. Although there are

departmental controls in place to assist in accuracy, there were no internal controls to determine whether the final radiology, pathology, or surgical decisions were, in fact, the correct conclusions for each case. Tumor board evaluation with cautious readings resulted in additional images and biopsies, and not all of these were malignant. However, based on the latest research findings, the effect on patient outcomes and survival is also unknown. Until outcome data are examined, the true risk-versus-benefit ratio is unknown. This is particularly significant when one considers the cost-effectiveness of this approach, which was not evaluated in the current study and may be prohibitive in some hospital settings.

Conclusions

The data from the current study revealed that greater than half (77 of 149 patients) of the patients evaluated at a breast cancer tumor board over the course of 1 year had changes in their recommended surgical treatment made based on radiographic, pathologic, and/or clinical interpretation. At least 7% of patients had previously undetected or residual cancers. There is emerging literature that supports breast cancer treatment involving the collaborative efforts of multiple medical specialties. The results of the current study demonstrate that the multimodality approach can provide important additional information, allowing expert opinion and recommendations based on the most recent research findings in 1 setting, resulting in changes in patient management.

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