Increased Mammographic Screening and Use of Percutaneous Image-Guided Core Biopsy in Non-Palpable Breast Cancer: Impact on Surgical Treatment

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Abstract

Background: Major efforts are being directed at the early diagnosis of breast cancer. The diagnosis rate of non-palpable tumors is steadily growing as a result of increased screening by mammography. In most patients with non-palpable lesions, percutaneous image-guided biopsies have replaced wire localization with surgical excision for obtaining tissue diagnosis. In recent years the Israel Ministry of Health initiated a mammograpy screening program. Percutaneous image-guided biopsies have also become widely available.

Objective: To assess the impact of these changes on breast cancer surgical treatment in our hospital.

Methods: The charts of 483 patients operated on in our department for primary breast carcinoma during the years 1997 to mid-2001 were reviewed. Data on the mode of diagnosis, tumor stage, resection margins, and number and types of operations were recorded and analyzed. The term non-palpable tumors relates to tumors necessitating wire localization for surgical excision.

Results: The percentage of patients diagnosed with non-palpable tumors rose from 16.2% in 1997 to 47.4% in 2001, with an average size of 2.6 cm for palpable and 1.7 cm for non-palpable tumors. The rate of preoperative diagnosis for non-palpable tumors rose from 6.2% in 1997 to 96.4% in 2001. The rate of involved or very close margins was reduced by 73% in the patient group diagnosed preoperatively as compared to those without a preoperative diagnosis (10.6% vs. 39.4%). Finally, the percentage of patients who had two operations fell from 56.2% in 1997 to 11.1% in 2001.

Conclusions: The mammography screening program in Jerusalem in 1997–2001 was effective in increasing the relative percentage of non-palpable breast cancers with reduced tumor size at diagnosis. The improved availability of preoperative tissue diagnosis in these patients reduced the number of surgical procedures needed.

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Screening for breast cancer is aimed at diagnosis at an early stage of the disease. When a suspected non-palpable lesion is detected on mammography, obtaining tissue diagnosis poses a challenge because accurate image guidance is required. Traditionally, tissue diagnosis in such cases was achieved by image-guided wire localization followed by surgical excisional biopsy. With this technique, a second operation is often needed for invasive cancer. This is in order to perform axillary lymph node dissection or sentinel lymph node biopsy. A second operation may also be required in order to obtain free margins or to proceed to mastectomy, when indicated. This technique has been largely replaced by percutaneous image-guided core biopsy [1]. Availability of a preoperative tissue diagnosis permits better planning of the treatment strategy and reduces the number of surgeries needed in most patients [2].

The aim of the present study was to assess the impact of enhanced mammography screening and improved availability of percutaneous image-guided biopsy in Jerusalem on the surgical practice and treatment for breast cancer at the Shaare Zedek Medical Center Breast Service.

Patients and Methods

Most patients treated in our breast service live in Jerusalem or its vicinity. The Israel Ministry of Health initiated a mail-driven mammography screening program at the end of 1996. The recommendation is for two-view mammography at 2 yearly intervals for women over the age of 50 at normal risk.

In Jerusalem, the largest health management organization is the Clalit Health Fund, followed by Meuhedet Healthcare Services. In January 1999 the services of a designated private breast screening and diagnosis center with high quality percutaneous image-guided core biopsy capabilities became available for Clalit patients in Jerusalem. Members of Clalit comprise approximately 75% of our patients. Most of the rest are insured by Meuhedet, which has also been providing such services since the beginning of 2000.

The charts of 483 primary breast cancer patients operated in our department during January 1997 through April 2001 were retrospectively reviewed. The ratio between palpable and non-palpable tumors was recorded separately for each year. Tumor size was recorded for the palpable and the non-palpable tumor groups separately. For the non-palpable tumor group, the mode of

diagnosis, type and number of surgical procedures performed were analyzed for each year and compared. The data on margin status in 56 of the patients diagnosed by percutaneous core biopsy who underwent lumpectomy were compared to the margin status of 79 patients who were diagnosed by surgical biopsy. Margin status was not relevant in the 10 preoperatively diagnosed patients who underwent mastectomy.

Margins were defined as follows: involved tumor cells at the inked surgical margins, very near- tumor cells at a distance of less than 1 mm from the surgical margins, near-tumor cells at a distance of 1–4 mm from the surgical margins, and free or no tumor cells within a distance of 4 mm from the surgical margins.

Results

Of 483 patients, 167 presented with non-palpable tumors, with a rise from 16.2% in 1997 to 48.5% and 47.4% in the years 2000 and 2001, respectively [Table 1]. The average tumor diameter was 2.6 cm in the palpable tumor group (n = 276) and 1.7 cm in the non-palpable tumor group (n = 144) [Table 2]. Information regarding mode of diagnosis was available for 145 patients with non-palpable tumors. The preoperative percutaneous diagnosis rate rose from 6.2% in 1997 to 96.4% in 2001 [Table 3].

When grouped together, involved and very close margins were found in 10.6% of the patients with preoperative diagnosis compared with 39.4% when diagnosis was obtained by a surgical biopsy. Near and free margins were found in 89.4% in the former group versus 60.6% in the latter.

Table 1. Percentage of non-palpable tumors

Year	Total no. of patients	Non-palpable tumors (no.)	Non-palpable tumors (%)
1997	99	16	16.2
1998	101	38	37.6
1999	121	35	28.9
2000	103	50	48.5
2001	59	28	47.5

Table 2. Average tumor size

Year	Average tumor size (mm) (range)	Palpable tumor size (mm) (range)	No. of tumors	Non-palpable tumor size (mm)	No. of tumors
1997	25 ± 10 (3–65)	26 ± 8 (8–6,526)	76	17 ± 10 (3–30)	13
1998	24 ± 17 (3–100)	29 ± 18 (5–10,029)	54	18 ± 11 (3–70)	37
1999	22 ± 1.1 (5–45)	25 ± 11 (8–4,525)	66	13 ± 6 (5–35)	28
2000	22 ± 15 (4–100)	25 ± 17 (3–100)	45	18 ± 10 (4–40)	45
2001	21 ±–8 (8–45)	23 ± 9 (10–45)	35	17 ± 5 (8–25)	21

Table 3. Rate of percutaneous preoperative diagnosis in non-palpable tumors

Year	Non-palpable tumors	Preoperative diagnosis	Preoperative diagnosis (%)
1997	16	1	6.2
1998	38	1	2.6
1999	35	12	34.3
2000	50	44	88.0
2001	28	27	96.4

In 1997, the percentage of patients with non-palpable tumors undergoing a second operation was 56.2%. With the increased availability of preoperative diagnosis, this was reduced to 11.1% in 2001. Altogether, 79.2% of patients with a preoperative diagnosis of invasive duct carcinoma had an axillary lymph node dissection, compared to 37.7% in the similar group without a preoperative diagnosis. These two groups were similar with respect to patient age and tumor characteristics.

Discussion

Once a non-palpable suspected mammographic abnormality is identified, image guidance is needed to obtain tissue diagnosis. The technique of needle-guided surgical biopsy has two main drawbacks: The first is the need to perform surgery for non-palpable mammographic abnormalities with a relatively low probability of being malignant. In our experience, before image-guided core biopsy became routine, 58% of wire-guided open surgical biopsies were negative. The rate of negative surgical biopsies in the literature is even higher, in the range of 66–77% [3,4]. Today, with percutaneous needle biopsies, many of these lesions can be followed safely without surgery. The second drawback is the need for two surgical procedures, which occurs in the majority of patients [5,6]. This is because of the need for re-excision in the presence of involved margins or in cases necessitating mastectomy, and for axillary lymph node dissection or sentinel lymph node biopsy, when indicated.

The reduction in the number of surgeries when percutaneous image-guided biopsies are employed is less impressive in the present series than in most others [5,7,8]. This can be attributed to our relatively liberal use of lumpectomy without axillary lymph node dissection in selected patients with invasive carcinoma, before we began to rely on sentinel lymph node biopsies. This approach, reported by others as well [9–12], includes the addition of axillary irradiation in most patients. We have generally abandoned this approach, since axillary irradiation is not justified for a negative sentinel lymph node biopsy. Nonetheless, it is clear that preoperative diagnosis had a significant impact on decision making, based on the fact that significantly more axillary dissections were performed when preoperative diagnosis was available. This difference in surgical approach is in spite of a close similarity in tumor characteristics and age between the groups of women with and without preoperative diagnosis. It appears that omitting axillary dissection in some patients diagnosed by a surgical biopsy was due to a reluctance to perform a second operation in cases that seemed to us to be borderline.

In elderly, high risk patients, where lumpectomy as the only surgical treatment followed by tamoxifen alone may be considered [9,10], needle-guided surgical biopsy can sometimes serve for both diagnosis and treatment, without a percutaneous image-guided biopsy. However, implementation of this approach is limited due to the lack of information regarding receptor status preoperatively.

The technique of image-guided percutaneous core biopsy for non-palpable mammographic findings was first introduced by Parker in the late 1980s [13], and has become the diagnostic modality of choice. This technique has been shown to be safe with

regard to local recurrence rate [14], low rate of missed diagnosis [15], and cost-effectiveness [6,16]. As shown here and by other authors [2,5,7], it is efficacious in reducing the number of surgeries needed compared to wire-guided surgical biopsy. Additionally, image-guided percutaneous biopsies are also effective for making surgical strategy decisions when a second, non-palpable finding is present on mammography [17]. In such cases, a positive core biopsy will basically dictate mastectomy, while a negative biopsy may sometimes permit lumpectomy.

It is evident that the increased mammography screening initiated in 1996 and improved availability of percutaneous image-guided biopsy capabilities since 1999 had a significant impact on treatment of breast cancer in our service. A dramatic increase in the detection of non-palpable tumors with a smaller tumor size at diagnosis occurred, together with a reduction in the number of surgeries needed. Since the Clalit Health Fund is the largest health management organization in Jerusalem, and a significant number of its breast cancer patients are treated in our breast service, we believe these changes reflect, at least in part, the trends in breast cancer treatment in Jerusalem in recent years. Efforts should be made to enhance mammography screening in the general population and in subpopulations with low compliance.

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