Preoperative Ultrasonic Assessment for Breast-Conserving Treatment

Tamotsu Kudo[1], Yoshino Kiyosawa[1], Iwao Ono[2], and Masaaki Kubota[3]

Summary. Our aim was to appreciate the value of our newly equipped ultrasonic device in assessing margin status and to evaluate the policy of oncoplastic surgery in breast-conserving treatment (BCT). Of 783 cases of primary breast cancer treated between January 1991 and December 2001, 407 cases undergoing BCT were studied. A GE-YMS Logiq 700 MR was introduced as the new device in January 2000 and its outcome was calculated. In BCT, we intended to take the policy of oncoplastic surgery with the goal of ultimately obtaining a negative margin using both image-guided biopsy and frozen section analysis. Ninety percent (366/407) of patients received radiation therapy. Outcome was calculated using crude rates of first site of failure. After introducing the new device, the rate of BCT increased to 80% (86/108) from 69% and the rate of pathologically negative margins (>5 mm; PNM) also increased to 91% (78/86) from 82%. At a mean follow-up time of 49 months, the overall local recurrence rate was 0.5% (2/407). Comparatively high percentages of BCT and PNM were obtained mainly by introducing the Logiq 700 MR. A small local recurrence rate (0.5%) was derived from taking the policy of oncoplastic surgery.

Key words. Breast neoplasms, Breast conservation therapy, Surgical margin, Local recurrence, Breast ultrasound

Introduction

From the standpoint of breast-conserving treatment (BCT) and quality of life, increase in the rate of BCT and in the rate of pathologically negative margins (PNM), and, ultimately, reduction of the risk of local recurrence rate (LRR), are the most important points and a paramount goal. The purposes of this study were to evaluate the newly equipped ultrasonic device for its contribution to the increase in rate of BCT and PNM, and to evaluate the policy of oncoplastic surgery [1] in BCT with respect to a reduction of LRR.

Departments of [1]Breast-Endocrine Surgery, [2]Pathology, and [3]Unit of Clinical Physiology, Nakadoori General Hospital, 3-15 Minamidoori Misono-cho, Akita 010-0012, Japan

Table 1. Characteristics of the 407 treated cases

Factor	
Age (years)	
<36	15
36–45	93
45–55	147
>55	152
T factor	
≦3.0 cm	334
>3.0 cm	73
Histology	
Ductal	387
Lobular	7
Other	13
n factor[a]	
Negative	260
Positive	98
Unknown	49
Chemotherapy	
Yes	150
No	257
Tamoxifen and/or goserelin	
Yes	243
No	164

[a] Pathologic factor

Materials and Methods

We studied 407 consecutive patients undergoing BCT from 783 cases of primary breast cancer between January 1991 and December 2001 in our hospital. The average age of the population was 51 years, with a range of 21 to 90 years. Eighteen percent (73/407) had a tumor size of more than 3 cm. The characteristics of the patient population are given in Table 1.

The conservative surgical technique generally employed was wide excision with axillary dissection. In terms of indications for BCT, patients with a diffuse malignant lesion or collagen vascular disease were not candidates for BCT. We intended to take the policy of oncoplastic surgery with the goal of ultimately obtaining a negative margin using preoperative breast imaging and intraoperative frozen section analysis (FSA). If the margin was identified as positive, additional tissue was taken from the exact site during the same surgery. Sometimes, we performed multiple reexcision for positive margins.

In terms of equipment, the GE-YMS Logiq 700MR Expert was introduced as a new ultrasonographic (US) device in January 2000. Previous US equipment was the Aloka SSD-650CL and GE-YMS Logiq 500 MR. The Gyroscan NT 1.5T. (magnetic resonance imaging, MRI) was introduced in 1997. The GE-YMS Senograph 600 and Lorad M-IV with Stereo Guide were used as mammography equipment.

In January 2000, we started to use the Logiq 700 combined with MRI for preoperative marginal diagnosis on a full scale. Preoperative fine-needle aspiration biopsy cytology, core biopsy under US guidance, and/or intraoperative FSA under marking by US with using a "line of sight" technique were performed to better define the boundaries.

Ninety percent (366/407) of the patients received postoperative radiation therapy (50.4–60.4 Gy). Follow-up including annual mammography was obtained as of March 2003, which resulted in average and median follow-up of 49 and 45 months, respectively.

Results

After introducing the Logiq 700MR, the rate of BCT increased to 80% (86/108) from 69% (1998) and 67% (1999). The rate of PNM (>5 mm) also increased to 91% (78/86) from 85% and 82% (Fig. 1). With respect to the prognosis, LRR (LR only or LR before distant metastasis) was 0.5% (2/407), and mortality was 4.4% (18/407), at an average follow-up time of 49 months (Fig. 2).

One LR case underwent BCT at 26 years of age with axillary lymph node metastases and positive margins were found (LR) at 28 years of age by clinical examination. Seven months after salvage mastectomy, liver metastasis was apparent, and the patient died at 30 years of age. In another LR case, mammography was indispensable in leading to the diagnosis. The LR was found at 58 years of age, 2 years after first treatment (BCT), and the patient underwent salvage mastectomy. She is now well without recurrence. We experienced salvage mastectomy in these 2 patients only (2/407).

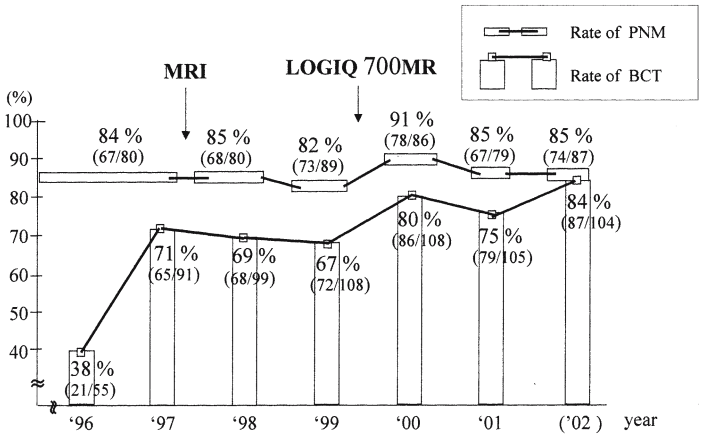

FIG. 1. Changes in the rate of pathologically negative margins (*PNM*) and breast-conserving treatment (*BCT*)

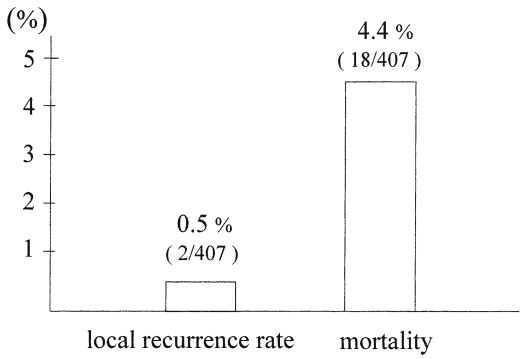

FIG. 2. Prognosis. Average follow-up time was 49 months; *local recurrence rate* only or LR before distant metastasis

Discussion

The development of equipment and technological support has provided physicians with the tools to perform accurate biopsy and diagnosis. An approach that has been explored for its utility in yielding negative margins uses intraoperative US to guide the initial surgery [2]. Breast MRI is helpful in preoperative evaluation of local tumor extent, however, with false-positive and false-negative diagnoses. Therefore, we started to use the Logiq 700 MR combined with MRI for marginal diagnosis. In addition to preoperative US-guided cytology or histology, we used FSA under US marking in various situation. As a result, the rate of BCT and PNM increased about 10% more than in previous years, and a high percentage of BCT was also maintained in the next year (75%, 2001) and the past year (84%, 2002). These high rates of BCT are thought to have been supported mainly by the Logiq 700 MR.

In respect of breast-conserving surgery, the battle is between margins and cosmesis. Our practice, in patients who wish and are candidates for breast preservation, was to attempt to widely excise the entire cancer lesion, invasive or noninvasive, achieving 5 mm or more margin in every direction, beginning in 1991. As a result, the LRR (at average follow-up time of 49 months) is extremely low (0.5%) in comparison with other reports [2–5]. This fact strongly suggests that the policy of oncoplastic surgery should be advocated.

Conclusions

1. A comparatively high percentage (75%–84%) of BCT, while maintaining a moderately high rate of PNM, was obtained by introducing the Logiq 700 MR.
2. A small number of local recurrences (0.5%; average follow-up time of 49 months) were derived from taking the policy of oncoplastic surgery, using FSA as well as preoperative image-guided biopsy.

References

1. Image-Detected Breast Cancer (IDBC) Consensus Conference. Palm Beach, FL, March 22–24, 2001

2. Singletary SE (2002) Surgical margins in patients with early-stage breast cancer treated with breast conservation therapy. Am J Surg 184:383–393
3. Kurtz JM, Amalric R, Brandone H, et al (1989) Local recurrence after breast-conserving surgery and radiotherapy. Cancer (Phila) 63:1912–1917
4. Haffty BG, Goldberg NB, Rose M, et al (1989) Conservative surgery with radiation therapy in clinical stage I and II breast cancer. Arch Surg 124:1266–1270
5. Smitt MC, Nowels KW, Zdeblick MJ, et al (1995) The importance of the lumpectomy surgical margin status in long-term results of breast conservation. Cancer (Phila) 76:259–267