Location and Frequency of Residual Breast Tissue after Mastectomy

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Keywords

Residual breast tissue · Remnant breast cancer · Post-mastectomy complication

Abstract

Introduction: Residual breast tissue after mastectomy is a problem since breast cancer can arise from it. The aim of this study was to investigate the incidence and location of residual breast tissue following modified radical mastectomy.

Methods: 111 consecutive breast cancer patients who underwent mastectomy were enrolled in this study. During surgery, after removal of the breast tissue and before skin closure, a 1-cm² tissue sample was obtained from each quadrant under the skin flaps. These samples were evaluated histopathologically for the presence of any residual breast tissue. **Results:** Residual breast tissue was detected in the tissue samples of 12/111 (10.8%) patients. 4 of these patients had residual breast tissue in all 4 quadrants. 6 patients had residual tissue in a single quadrant. With 9 positive biopsy results, the upper medial quadrant was the most frequently involved location. The other quadrants had 6 positive biopsy results each. At the end of a median of 20 months of follow-up, none of these patients developed breast cancer recurrences. **Conclusion:** Mastectomy has a high probability of residual breast tissue being left behind. Physicians should be aware of this and act accordingly when planning surgical or follow-up treatment.

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Introduction

Breast cancer is the most common cancer among women worldwide [1, 2]. While breast-conserving surgery (BCS) is the standard treatment of choice, modified radical mastectomy (MRM) is still used in certain cases [3]. Widely accepted indications are: large and centrally located tumors, small breast size unsuitable for extensive tumor removal, multicentric carcinomas, inadequate previous BCS, recurrence after BCS, extensive carcinoma in situ detected after BCS, prophylactic mastectomy due to a strong genetic disposition, any contraindication for radiotherapy, and patient preference.

After MRM, there is still a risk of breast cancer recurrence; incidence is reported to be between 2 and 9.5% [4, 5]. One possible explanation is the development of breast cancer from residual breast tissue. However, the incidence of residual breast tissue after mastectomy has not been extensively analyzed, and there is only a small number of studies on this topic [4, 6]. The aim of this study was to investigate the incidence and location of residual breast tissue following MRM and to follow patients with residual breast tissue for signs of tumor recurrence.

Patients and Methods

A total of 111 consecutive breast cancer patients who underwent MRM between July 2015 and February 2017 were enrolled in this study. Patients who had previously received neoadjuvant therapy were excluded. None of the patients were male. All patients received simple mastectomy and sentinel lymph node biopsy. Pa-

Fig. 1. Ductus and acini belonging to breast tissue embedded in fat tissue (×100, H-E).

Fig. 2. Connective tissue embedded in fat tissue; there is no breast tissue (×100, H-E).

tients with intraoperative tumor-positive sentinel lymph node biopsy results were converted to MRM. Flap thickness was approximately 3 mm for all patients. Using a scalpel, 1 cm² of material was taken from the tissue underlying the flaps in all quadrants after removal of the breast tissue and before skin closure. Operations were performed by 21 different surgeons within the clinic.

The biopsy specimens, after being embedded in paraffin blocks, were cut into 5 µm-thick sections and stained with hematoxylin-eosin. Under light microscopy, any breast tissue elements like ducts or acini were accepted as positive (figs. 1, 2).

All patients were above the age of 18 and gave written consent prior to surgery. Ethical committee approval was obtained from Ankara Oncology Hospital (2014-5/97). The study was performed in accordance with the Declaration of Helsinki. Statistical Package for the Social Sciences for Windows 23 (SPSS, Inc., Chicago, IL, USA) was used to analyze the results.

Results

The characteristics of the patients and specimens are given in table 1. The median age of the patients was 54 years (range 22–85 years). In 25 (22.5%) patients, sentinel lymph node biopsy was tumor-negative; the remaining patients underwent MRM. In 66 (59.5%) patients, the tumor was located in the left breast. None of the patients required bilateral mastectomy. Mean tumor size was 2.53 ± 0.71 cm (0.7–4.4 cm). A median number of 15 (range 6–39) lymph nodes was collected during MRM. A median of 1 (range 1–32) lymph node was tumor-positive. Histopathologically, invasive ductal cancer (72%) was the most frequent tumor type, and grade 3 disease (57.7%) was also most frequent. 88 (79.2%) patients had estrogen receptor positivity and 70 patients were +++. 82 (73.8%) patients had progesterone receptor positivity but only 43 patients were +++. 62 (55.9%) patients had a c-erbB2 score of 0.

Table 1. Demographics of patients

Age, median (range), years	54 (22–85)
Modified radical mastectomy, n (%)	86 (77.6)
Left side, n (%)	66 (59.5)
Bilateral mastectomy, n (%)	–
Tumor size, mean ± standard deviation (range), cm	2.53 ± 0.71 (0.7–4.4)
Collected lymph nodes, median (range), n	15 (6–39)
Tumor-positive lymph nodes, median (range), n	1 (1–32)
Invasive ductal cancer, n (%)	80 (72)
Grade 3, n (%)	64 (57.7)
Estrogen receptor positivity, n (%)	88 (79.2)
Progesterone receptor positivity, n (%)	82 (73.8)
cerbB2 score 0, n (%)	62 (55.9)
Biopsy specimen tumor-positivity, n (%)	12 (10.8)
Follow-up time, median, months	20

Table 2. Location of positive biopsies

Patient	Upper inside quadrant	Upper outside quadrant	Lower inside quadrant	Lower outside quadrant
1	+	+	+	+
2			+	
3	+			
4				+
5	+			
6		+	+	+
7	+	+	+	
8	+	+	+	+
9	+			
10	+	+	+	+
11	+			
12	+	+	+	+

The biopsy specimens of 12 (10.8%) patients included residual breast tissue. Table 2 describes the location of the positive biopsies. 4 of these patients had residual breast tissue in all 4 quadrants. 6 patients only had residual tissue in a single quadrant. With 9 positive biopsy results, the upper inner quadrant was the most frequently involved location. All other quadrants had 6 positive biopsy results. 4 (3.6%) patients had partial skin flap necrosis after the operation; all were managed with local wound care with no need for surgical debridement.

Discussion

To the best of our knowledge, only a small number of studies have investigated the incidence of residual breast tissue after mastectomy, with even fewer studies having researched its location. In their study of 206 patients, Griepsma et al. [4] collected 36 specimens from each patient, to a total of 7,416 biopsy samples. 76.2% of patients had at least 1 residual breast tissue in their biopsy specimens. The lower outer quadrant of the breast was the place with the highest incidence of residual breast tissue, compared with our study where the upper inner quadrant had the highest number of positive biopsy result.

In another study reported by Tewari et al. [6], 8 (21.6%) of the 37 included patients had residual breast tissue under the flap. Their findings were similar to ours, although patient numbers were lower. Furthermore, breast cancer was found in 3 of the 8 patients after pathologic evaluation of the residual tissue. When considering these 3 studies from 3 different countries, differences in results may stem from variances in flap thicknesses, which was not reported by previous authors. However, the most likely explanation is the sheer number of biopsies used in the study by Griepsma et al. [4]. Their study evaluated 36 biopsies per case while the other studies included only 4 samples from each patient. If we had taken as many biopsies, we may have obtained similar results. On the other hand, differences may also have arisen from inconsistent

sampling techniques since Griepsma et al. [4] took their tissue samples from the superficial dissection plane of the mastectomy specimens and not the mastectomy cavity.

It is universally believed that some breast tissue is left behind after most mastectomies since the dissection plane between the skin and the superficial plane is not always clear. The amount of breast tissue left may also be affected by the surgical technique. Studies of skin-sparing mastectomy revealed that 5–60% of cases have residual breast tissue on the skin flaps [7–9]. The risk is higher in flaps thicker than 5 mm. Leaving some benign breast issue behind may not be so problematic, but leaving residual disease is a major issue. Residual disease was found in some of the studies [6–8]; others also suggested that development of local recurrence is also possible from the site of residual normal breast tissue [10, 11]. There are also reports of breast cancer development after prophylactic mastectomy, although these are usually associated with de novo breast cancer [5, 12, 13].

After a median of 20 months of follow-up, none of our patients developed breast cancer recurrence. We were not able to compare the impact of residual breast tissue in skin flaps on recurrence; after a follow-up of 5–10 years, we may have a clearer understanding. Previous studies from our clinic showed a recurrence rate of 1.4–4.3% in this group of patients [14, 15]. Since the precise sampling locations are known, we can follow these patients for 5–10 years to investigate the risk of breast cancer from residual breast tissue.

This study is an important reminder that even after mastectomy with 3 mm-thick flaps, some residual breast tissue may remain. This should be kept in mind when deciding on mastectomy over BCS.

Disclosure Statement

The authors declare no conflict of interest.

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