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Research article

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Clinical significance of pathologically detected lesions in reduction mammoplasty

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Abstract

Background/Aim: Breast reduction surgery is performed for various reasons, especially macromastia. Although the mammoplasty material obtained after surgery is generally accepted as normal breast tissue, incidental breast cancer or precursor lesions of breast cancer are also observed in these materials. Detection of these lesions will provide important information both for the risk developing breast cancer in the normal population and for the early treatment of these lesions. Our study aimed to investigate the rate of occurrence of high-risk lesions, such as atypical ductal hyperplasia (ADH), atypical lobular hyperplasia (ALH), and carcinoma *in situ* (DCIS, LCIS) and the relationship of these lesions with patient age and weight of the resected material.

Methods: This study was a retrospective cohort study examining incidentally detected pathological lesions after examining reduction mammoplasty materials after breast reduction in our pathology department between 2011 and 2021. None of the cases had been previously diagnosed with breast cancer. The cases were pathologically classified as benign lesions, high-risk lesions with atypia, and *in situ* carcinoma. The association of atypical high-risk lesions with age (> 40 and ≤ 40 years) and resection weight was evaluated.

Results: The surgical materials of 288 breasts were evaluated in a total of 144 women. The mean age of the patients was 38.9 years. Atypical high-risk lesions, such as ADH, ALH, and DCIS were detected in seven patients (4.8%). İnvasive cancer was not observed. The mean age of the patients with risky lesions was 45.98 years, and the mean weight of these lesions was 2,045 grams. Cases with high-risk lesions were older (P = 0.041) and had a higher resection weight (P = 0.003).

Conclusion: The findings in our study reveal the necessity for mandatory histopathological examination of reduction mammoplasty materials. This examination is even more important in terms of high-risk lesion detection, especially in patients over 40 years and those with a high resection weight. In these cases, taking more tissue samples than used for the other situation for examination is recommended.

Keywords: Mammoplasty, Atypical hyperplasia, DCIS, Breast carcinoma

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Introduction

Breast reduction operations are performed for various reasons, especially macromastia. The pathological examination of surgical materials is important for the detection of risky proliferative lesions that may be a precursor to breast cancer. The pathological examination of reduction mammoplasty materials is more important in terms of detection of these lesions and incidental carcinomas, especially among patients in their 40s with an increased risk for developing breast cancer and those with a family history of this cancer [1].

Reduction mammoplasty materials are usually reported as benign proliferations, such as normal breast tissue, fibrocystic changes, fibroadenoma, flat epithelial changes, usual ductal hyperplasia, apocrine metaplasia, intraductal papilloma, adenosis or risky proliferative lesions, such as and atypical ductal hyperplasia (ADH), atypical lobular hyperplasia (ALH), flat epithelial atypia (FEA), intraductal papilloma with atypia, and ductal and lobular carcinoma *in situ* (DCIS, LCIS). These atypical lesions are known to carry a higher risk of developing breast cancer than normal lesions [1, 2].

Among the common screening programs to determine the risk and rate of breast cancer development in the population, general breast examinations, mammography scans, and autopsy evaluations have an important place [3]. However, some of these practices may contain a slight age-related bias. Regardless of age, family history, and previous breast cancer history, high-risk lesions and cancer prevalence detected incidentally in reduction mammoplasty materials can provide important information concerning the overall risk of developing breast cancer [4]. On the other hand, data obtained from examination of these materials can guide screening and prevention strategies. In other words, high-risk lesions detected incidentally in materials removed during breast reduction may represent the most real-life data in terms of detecting the prevalence of breast cancer development in the general population.

Many studies examining lesions in breast reduction materials have been conducted. These studies have reported different risky lesions and cancer detection rates. Mammoplasty studies conducted evaluating cases without a previous history of breast carcinoma indicate that the incidence of incidental cancer and high-risk lesions generally ranges from 1.5% to 8.9% [5–7].

In a study including 2,498 reduction mammoplasty cases, Desouki et al. found 4.3% high-risk lesions, 0.16% DCIS lesions, and 0.08% invasive carcinomas [8]. In a recent study, it was reported that the rate of invasive carcinoma and carcinoma *in situ* increased to 2.3% and the rate of proliferative risky lesions to 13.8% [9].

This study aimed to evaluate the relationship between the detection rate of lesions carrying a particularly high risk for breast cancer development that were found in the materials removed during reduction mammoplasty operations performed for reconstructive reasons and patient ages, and weights of resected tissues.

Materials and methods

A total of 144 patients who underwent mammoplasty at Atatürk University Medical Faculty Research and Application Center between January 1, 2011, and December 31, 2021 were included in the study. None of the cases had previously been diagnosed with breast cancer or had undergone breast surgery for any reason, and all underwent surgical reduction mammoplasty for reconstructive purposes for reasons such as macromastia. At least three paraffin blocks were taken from the resected tissues for each breast, and the diagnosis was made by examining the hematoxylin and eosin (H&E)-stained sections. Some tissues were sampled more than others. The pathology reports of the patients were screened from the hospital information system. The diagnoses obtained from the reports were classified in terms of patient age, weight of resected tissue, and risk status according to the lesion type. Furthermore, data obtained by evaluating the relationship of high-risk lesions with patient age and weight of resected tissue are discussed in light of studies in the literature.

Statistical analysis

The cases included in the study were divided into two groups according to the diagnostic risk of lesions (high-risk ADH, ALH, DCIS, and other atypical lesions), two groups according to age (≤ 40 years and > 40 years), and three groups according to resected tissue weights (1,000 grams, 1,000–3,000 grams, and > 3,000 grams). The Pearson/Spearman correlation test was used to determine the correlation between all the groups. A *P*-value of < 0.05 was accepted as statistically significant. Data analysis was performed using IBM SPSS statistics v. 20.

Results

The surgical materials from 288 breasts (144 patients) were evaluated. The pathology results were generally reported as normal breast tissue, fibrocystic changes, (fibrosis, adenosis, macro cyst, micro cyst apocrine metaplasia) ductal ectasia, usual ductal hyperplasia, FEA, fibroadenoma, intraductal papilloma, ADH, ALH, and DCIS. The majority (95.2%) of the cases received a diagnosis of normal breast tissue or benign and benign proliferative lesions. High-risk lesions were detected in seven individuals (4.8%). The general distribution of the cases is summarized in Table 1.

Table 1: General distribution of pathological lesions

Lesion group	Lesion type	Mean weight of resected tissue (g)	Mean age	n	%
Benign Lesions	Fibrocystic changes (fibrosis, adenosis, macro-microcyst and apocrine metaplasia, etc.)	1,366.88	39.2	68	47.2
	Fibroadenoma	1,475.25	33.1	10	6.9
	Ductal ectasia	1,208.31	41.2	7	4.9
	Intraductal papilloma	1,375.25	37.3	7	4.9
	Usual ductal hyperplasia	1,854.10	43.9	14	9.7
	Other	993.75	36.5	31	21.5
Atypical High-Risk Lesions	Atypical ductal hyperplasia	2,075.78	46.7	3	2.1
	Atypical lobular hyperplasia	2,045.00	48	1	0.7
	Flat epithelial atypia	1,910.00	46	1	0.7
	Apocrine atypia	2,150.00	38	1	0.7
In situ	Ductal carcinoma in situ	1,875.00	51	1	0.7
Carcinomas	Lobular carcinoma in situ	0	0	0	0.0
Invasive Carcinom	Ductal, lobular, other	0	0	0	0.0
Total			38.9	144	100

The mean age of the patients was 38.9 years, and 75 (52.08%) were ≤ 40 years old and 69 (47.91%) were > 40 years old. The youngest patient was 17 years old, and the oldest was 64 years. The mean age of the patients with risky lesions was 45.98 years, and six of these patients were in the > 40 years group, while one was under 40. The incidence of high-risk lesions was

higher and statistically significant over 40 years than under 40 years (P = 0.041). The weight of resected tissue was < 1,000 grams in 60 (41.7%) cases, between 1,000 and 3,000 grams in 68 (47.2%), and > 3,000 grams in 16 (11.1%). The lowest weight of resected tissue was 110 g, and the highest weight was 3,410 g with the average weight per breast being measured as 1180 g. The mean weight of high-risk lesions was 2,045 g with one weighing < 1,000 grams, two weighing between 1,000 and 3,000 g, and four weighing > 3,000 g. The incidence of high-risk lesions with atypia was higher in cases with high resection weights (P = 0.003).

Discussion

The breast is very important for a woman's physical and mental health. However, women may need to undergo breast surgery at any time during their lives for a wide variety of reasons related to various disorders. Malignant and benign lesions of the breast are among the most important causes of the need for breast surgery. On the other hand, breast reduction operations are frequently performed due to macromastia, a condition that causes back pain and spinal and balance disorders. In addition, women with cancer in one breast usually undergo mammoplasty on the other breast to correct the asymmetry between the two breasts. The pathological examination of tissues removed after these operations is very important. Breast cancer is the most common cancer in women and is a major cause of mortality and morbidity in women. It is stated that in 2021, 284,200 new breast cancers will be detected in the United States, and 43,600 deaths will result from this diagnosis [10].

Pathological examinations of breast tissues obtained after reduction mammoplasty offer very important opportunities for the detection of lesions observed in the breasts or that are likely to be seen later. It is known that many lesions are associated with an increase in the risk of developing breast cancer in the future. In this regard, the detection of proliferative atypical breast lesions is very important in terms of the possibility of subsequent breast carcinoma development. In a study by Hartmann et al., it was reported that the increase in the risk for cancer development was 1.3 times for non-proliferative lesions, 1.9 times for proliferative lesions without atypia, and 4.2 times for atypical proliferative lesions [10, 11]. In addition, Wang et al. reported that the risk of breast cancer significantly increased even when benign breast lesions were found and was independent of other risk factors for breast cancer [12].

Mammoplasty studies evaluating cases with no prior history of breast carcinoma have shown that overall incidence of incidental cancer or high-risk lesions ranged from 1.5% to 13.8%. In many studies, it has been reported that the risk of proliferative lesions and carcinoma is higher in patients of advanced age and those with a family history of breast cancer [9]. In a cohort of 2,498 cases, Desouki et al. found that invasive carcinoma occurred at a rate of 0.08% and DCIS at 0.16%. The authors reported the prevalence of high-risk lesions as 4.3% [8]. In a study by Cook et al. with 1,289 patients, lesions with uncertain malignant potential were detected in 2.0% of reduction mammoplasty materials, DCIS in 0.3%, and invasive carcinoma in 0.1% [13]. In another study, including a total of 595 patients, significant pathological findings were detected in 9.8% of the patients, and the rate of carcinoma *in situ* was reported as 2.4%. The authors emphasized that increasing the sampling number would have resulted in detection of a higher number of lesions [14].

In a review by Uson et al., it was stated that the incidence of pre-malignant and malignant lesions was around 5%, and the rate of invasive carcinoma was 0.3% in breast reduction surgery samples. This risk was reported to be significantly higher in patients older than 40 years of age. In the same study, it was noted that taking at least four paraffin block samples would have significantly increased the lesion detection rate [6]. Acevedo et al., who evaluated a total of 4,775 cases, found pathological findings in 7.06% and detected high-risk lesions at a rate of 6.26%. The incidental detection rates were determined as 0.48% for DCIS and 0.31% for invasive carcinoma. It was also concluded that atypia and cancer rates increased with age [15].

Pitanguy et al. found the rate of carcinoma *in situ* as 0.5% in a total of 2,488 cases over a 45-year period and emphasized the importance of the histopathological examination of reduction mammoplasty materials [7]. In an autopsy study, Nielsen et al. determined that the total rate of ADH, ALH, and DCIS was 7% [3]. In a meta-analysis evaluating a total of 13 studies, Thomas et al. stated that the rate of invasive cancer was 0.85%, and the incidence of carcinoma *in situ* and ductal and lobular atypical hyperplasia was 8.9% on average [4].

In the review of Ambaye et al. [16], it was stated that since mammoplasty materials were randomly sampled from breast tissue, data obtained from the literature studies showed the minimum rates and the lesion detection rates would increase by increasing the number of samples. On the other hand, the authors found no relationship between large resection weight and positive pathologies.

In another study, Fisher et al. [17] suggested that careful histological examinations of breast reduction specimens were required. In that study, patients with a family history of breast cancer, previous breast surgery, and more breast tissue resected exhibited a greater risk of having proliferative or cancerous lesions. The authors stated that as the weight of the resected breast tissue increased, the probability of positive pathologies also increased; therefore, patients with larger breasts would likely have greater resection weights and thus, present a higher tendency to have positive pathologies. On the other hand, studies supporting the idea that breast volume is a risk factor for breast cancer recurrence and mortality have been published [18] in contrast to others indicating no relationship between breast weight and atypical lesion detection [16].

Tadler et al. [19] reported that the rate of breast cancer-related lesions was 2.8%, and the rate of carcinoma *in situ* was 0.9%. The authors found the rate of *in situ* carcinoma to be 5.5% higher among the materials resected during asymmetry correction mastectomy performed in patients with a history of cancer in the contralateral breast. Another analysis reported that the presence of positive pathologies was associated with advanced age, higher body mass index, and history of cancer, and a positive association between larger resection weight and positive pathologies was described [9].

In our study, high-risk lesions were detected in 4.1% of the cases and carcinoma *in situ* in 0.07%. Our findings are consistent with those in the literature. In addition, hyperplasia with atypia was observed in older patients and in cases with more breast mass. Our findings are valuable in terms of indicating the importance of a more careful examination of tissue samples in patients over 40 years and those with larger amounts of resected materials. Taking a higher number of samples and performing a meticulous microscopic examination of the above-mentioned groups can increase the probability of detecting important pathological findings.

Limitations

Although the number of cases in our study and the number of blocks taken from the tissues were acceptable for evaluation, these factors may still limit our ability to generalize them to the rest of the population. Therefore, analytical studies with more variables in larger patient groups in the future should be performed.

Conclusion

The findings in our study reveal the necessity of mandatory histopathological examination of reduction mammoplasty materials. This examination is even more important in terms of high-risk lesion detection, especially in patients over 40 years of age and with a high resection weight. In these cases, taking more tissue samples than for other cases for examination is recommended. On the other hand, careful follow-up of the pathology reports of these cases by clinicians is important for the management of atypical cases with atypia.

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