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The role of reduction mammaplasty in oncology

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Abstract. *Background:* A procedure to achieve symmetry is required in almost 50% of the cases of breast reconstruction and provides an opportunity to explore the second breast and eventually to remove any area which is suspect. The various techniques available for the symmetry procedure should be discussed according to the breast exploration required. This study analyzes the different types of reduction mammaplasty (RM) techniques, the histology and localization of contralateral tumors which allow the plastic surgeon to diagnose occult breast cancer more accurately. *Method:* From 1978 to 1993, 1814 patients with breast cancer underwent a mastectomy with breast reconstruction at the Gustave-Roussy Institute. A contralateral RM to achieve symmetry was performed in 440 patients. *Results:* Twenty (4.5%) clinically and radiologically occult breast cancers were found among the contralateral RM specimens. The relationship between the type of RM technique and incidence of occult breast cancer was not significant: 16 cases of occult breast carcinomas in 305 RM with supra-areolar pedicle and four cases from 135 RM with infra-areolar pedicle (Fisher exact p=0.21). *Conclusion:* Close collaboration between plastic surgeon and oncologist is required while performing a breast reconstruction in order to take advantage of the surgery of the second breast to explore the gland and to remove occult carcinomas in approximately 5% of cases. The choice of RM procedure depends usually on the shape of the breast and often the personal preference of the surgeon but this should also be planned according to the glandular area to be explored. There results underline the absolute necessity of histological examination of all the specimens removed in all kinds of breast reduction also when it is performed for purely aesthetic reasons.

Key words: Occult breast cancer – Contralateral breast cancer – Reduction mammaplasty – Breast reconstruction

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Nowadays, the plastic surgeon takes an active role in the surgical treatment of breast cancer. He performs immediate or delayed breast reconstruction or reshapes the breast after conservative treatment. In addition, he performs contralateral mammaplasty to achieve symmetry. The rates of bilateral breast cancer vary from 75 to 11% [1, 2]. Some authors [3–5] have used the increased risk of contralateral cancer to justify a prophylactic mastectomy of the opposite breast following radical surgery of the primary. Others [6] proposed a protocol advocating a "mirror biopsy" of the contralateral breast. Therefore, particular attention should be focused on occult carcinoma diagnosis during the contralateral breast procedure [7].

This study analyzes the incidence of occult carcinoma (without clinical and radiological signs) in specimens of the contralateral breast removed to produce symmetry. The characteristics of the tumor, the RM technique and the treatment performed are analyzed to determine how the plastic surgeon can diagnose occult breast cancer more accurately.

Material and methods

From 1978 to 1993, 1814 patients with breast cancer underwent mastectomy and breast reconstruction at the Gustave-Roussy Institute (IGR). A contralateral mammaplasty for symmetry was performed on 813 patients (44.8%). Of these 813 cases, 373 (20.5%) had a mastopexy (without a histologic specimen) and 440 (24.2%) patients had a RM.

The clinical examination of the breast by the surgeon on the preoperative day was performed in all cases. Eighteen patients had a normal contralateral mammogram (with two views: frontal and profile) before the operation and two patients presented only benign microcalcifications. All mammograms were analyzed by the IGR breast radiology team.

The operation was performed by one team having double oncological and plastic training. The plastic surgical procedure was chosen according to the size and degree of breast ptosis. There are basically two techniques:

Supra-areaolar pedicle [8, 9]

Marking is performed the day before surgery with the patient in the upright position. The location for the upper margin of the areola is determined and a midbreast line (mid-clavicle to nipple) and inframammary crease are marked. The new nipple position will be located on a point on this midbreast line, approximately 19 to 21 cm from the sternal notch. To determine the amount of tissue to be resected the breast is grasped and two points are marked to become the inferior pole of the areola. Afterwards, a traditional key hole is drawn.

Firstly, the areola is marked out using a standard template. The area between the areola periphery and the "key hole" is de-epithelialized and a large glandular excision can be performed in the lower quadrants or central quadrant. A deep undermining of the gland following by a careful examination of the remaining gland is necessary before shaping the breast. Non-absorbable stitches are placed in order to approximating the two columns of breast tissue and the nipple is thrust upwards into its final position. A periareolar and small inverted scars remain at the end.

Infra-areolar pedicle [10, 11]

This technique preserves a central, inferior breast mound surmounted by the nipple and areola. This breast parenchyma is supplied by lower perforating intercostal arteries and direct intercostal arteries. As an option, an inferior dermal pedicle may also be preserved.

The markings for the infra-areolar pedicle are similar to those described for the supra-areolar pedicle. The inferior pedicle is drawn with an 8 to 10 cm wide base and it extends to 1 cm above the areola.

The surgery begins with pedicle deepithelialization and section of the glandular tissue tangentially, laterally and superiorly in order to maintain an attachment to the thoracic wall and preserve the intercostal vessels. The breast parenchyma is removed in a "horse shoe shape" in the following quadrants: lower outer, lower inner, and upper.

After resection, the pedicle is mobilized upwards and the areola is sutured into its new position and the lateral glandular columns are sutured over the dermal pedicle. A periareolar and long inverted T scar remains at the end.

For this study a biopsy of all suspicious zones was performed and all specimens were oriented with stitches or fixed on a sterile cork board.

All specimens were oriented and examined immediately by the pathologist and completely dissected using 1.5 to 2.09 mm slices. All suspicious zones as well as some normal areas were submitted to histologic analysis. Specimens were fixed in alcohol-formol-acetic, dehydrated, embedded in paraffin, cut into slices 5 microns thick and stained with hematoxylin-eosin-safranin. All slides were analyzed by the IGR team of breast pathologists and reviewed for the study by two authors (GC and FB) to confirm the diagnosis. In this series, the average number of samples examined per reduction specimen was 13 (range 6 to 23). A clear orientation of the specimen is fundamental to allow the pathologist to give a precise location of the lesion for further treatment and eventual re-excision. The very careful approach to the histologic analysis played an important key role in the incidence rate of occult carcinoma [12]. The pathologist needs to perform a meticulous macroscopic examination of a large number of samples to analyze all suspect areas. The average number of samples examined in our series was 13.

The primary cancer had been treated by a modified radical mastectomy in 19 out of the 20 cases and a salvage mastectomy was performed in the last case for a recurrence after conservative treatment.

Results

Of the 440 patients treated by a contralateral RM to achieve symmetry, 20 cases (4.5%) had occult carcinoma.

Table 1. Comparison between incidence of occult carcinoma and reduction mammaplasty (RM) technique used

	With occult carcinoma	Without occult carcinoma
RM with superior pedicle	16	289
RM with inferior pedicle	4	131

Fisher Exact test p=0.21

Immediate breast reconstruction was performed in 12 cases and delayed in 8 cases. In 12 cases, the RM was performed at the same time as the mastectomy and breast reconstruction. Thus, the contralateral tumor was synchronous in these cases, and metachronous in 8 other cases (range 1 to 15 years).

In this series, 305 patients had a RM with a superior pedicle and 135 with an inferior pedicle, and the distribution of the occult carcinoma in relation with the RM technique, analyzed by Fisher Exact test, was not significant (p=0.21). These results are shown in Table 1.

The contralateral tumors were found in the lower quadrants in 11 cases, in the upper quadrants in 5 cases, and in the central or at the inner junction in 3 cases; in one tumor the exact location was unknown. The site of the contralateral lesions was compared with that of the first primary, and its position was "mirror" in only 4 cases. The histologic findings and position of the primary tumors and contralateral tumors are detailed in Table 2. "In situ" carcinoma was found in 13 cases and infiltrating carcinoma was found in 7 cases (15%). The average tumor size was 77 mm (range from 2 to 16 mm) and in 8 cases the tumor (LCIS or DCIS) was not measurable.

The treatment of the contralateral breast was conservative (reduction mammaplasty with free tumor margins and external radiotherapy) in 12 cases, mastectomy with breast reconstruction in 4 cases presenting with an extensive lesion and only follow-up in 4 cases, since there was complete excision of the lesion.

Discussion

Twenty occult carcinomas were diagnosed in 440 contralateral RM during breast reconstruction among which were 17 "in situ" and 7 infiltrating carcinomas; conservative treatment was performed in 16 cases (80%).

These results are consistent with those of other authors who performed blind contralateral biopsies of breast tissue excised from upper outer quadrant or "mirror" biopsies. Urban et al. [13] reported a total incidence of 7.6% in a group of 301 truly blind biopsies, with 1.7% of the biopsy specimens showing invasive carcinoma. Wanebo et al. [14] reported a total incidence of 11% (with 2.2% of invasive carcinoma) in 40 blind biopsy specimens. Smith et al. [15] found a total incidence of 5.3% (and 2.1% of invasive carcinoma) in a series with 95 blind biopsy samples. The main difference between these series and ours is the technique used. A mirror bi-

Table 2. Histologic types and localisation of primary tumors and contralateral tumors

Pt. N°	Primary tumors			Contralateral tumors		
	Tumor quadrant localisation	Macroscopic size (mm)	Histologic findings	Tumor quadrant localization	Macroscopic size (mm)	Histologic findings
1	Lower outer	25	IDC	Upper junction	5	DCIS (non comedo type)
2	Upper outer	*	DCIS (comedo type)+ CLIS	Upper inner	5	DCIS+CLIS
3	Outer junction	8	Tubular carcinoma	Lower junction	10	DCIS (non comedo type)
4	Lower inner	15	IDC+DCIS (comedo type)	Lower outer	*	LCIS
5	Upper outer	*	LCIS	Upper outer	6	Tubular carcinoma, EIC+
6	Upper junction	35	IDC	Lower inner	16	IDC, EIC+
7	Diffuse	*	DCIS (non comedo type)	Lower inner	10 10	IDC
8	Upper outer	38	IDC	Upper junction	3+10+10	Tubular carcinoma
9	Upper outer	20	DCIS+LCIS	Unknown	*	LCIS
10	Upper outer	*	DCIS+LCIS	Inner junction	*	LCIS
11	Upper outer	50	IDC	Lower junction	*	DCIS (non comedo type)
12	Lower junction	*	IDC	Lower inner	15	DCIS (comedo type)
13	Lower inner	*	DCIS (comedo type)	Lower junction	*	DCIS (non comedo type)
14	Outer junction	25+15	IDC, EIC+	Lower junction	*	CLIS
15	Diffuse	*	DCIS (comedo type)	Lower junction	*	CLIS
16	Upper outer	23+20	IDC	Central	*	DCIS+CLIS
17	Lower outer	15+10+10	IDC	Upper outer	2	IDC
18	Upper outer	*	ILC	Inner junction	5	ILC
19	Lower outer	*	DCIS (non comedo type), microinfiltrating type	Lower outer	4	CLIS+ILC
20	Upper junction	*	DCIS (non comedo type)	Lower junction	8	DCIS micro infiltrating type

* Diffuse tumors.
IDC – Infiltrating Ductal Carcinoma.
DCIS – Ductal Carcinoma In Situ.
LCIS – Lobular Carcinoma In Situ.
ILC – Infiltrating Lobular Carcinoma.
EIC+ – Extensive Intraductal Component.

opsy or blind biopsy performed as described by Wanebo et al. could give a more visible scar and distortion of the breast. Moreover, the area to be explored is always more limited than the area explored during a breast reduction procedure. Thanks to the wide undermining of the glandular tissue, biopsies in different quadrants of the breast without cosmetic consequences can be performed especially with the upper pedicle technique.

The incidence of occult carcinoma found, compared with the type of reduction mammaplasty technique used was not significant (5.2% of cases with superior pedicel RM versus 1.3% of cass with inferior pedicle RM). In our series, only two occult carcinomas were found in the upper outer quadrant and another two in the upper quadrants junction. Spratt and Donegan [16] stated that 48% of breast carcinoma are localized on the upper outer quadrant, thus RM with inferior pedicle should be better for discovering occult breast cancer because the glandular tissue removed is in the upper quadrants junction and part of the upper outer quadrant. However, the supra-areolar pedicle does not exclude the possibility of glandular removal in the upper inner and outer quadrant, provided that at

least 1 cm of gland and fat has been preserved under the skin in the supra-areolar area. Therefore, when a suspicious area is observed in the direct supra-areolar area, it is mandatory to choose the inferior pedicle technique especially when the lesion is thought to be superficial. The supra-areolar technique can be used when the lesion is deeply located in the gland, far from the skin and when the area to be resected is located in the lower junction of the breast or deeply, behind the areola complex.

This study demonstrates the need for close collaboration between plastic surgeon and oncologist during breast reconstruction. The plastic surgery performed for aesthetic purposes should be integrated into the cancer treatment and considered as an explorative procedure allowing occult contralateral cancer treatment. Careful evaluation of the mammogram and thorough palpation of the gland during the procedures to achieve symmetry of the contralateral breast even in the case of bilateral reduction mammaplasty for aesthetic purposes is necessary [17]. All specimens removed during breast reduction mammaplasty should be sent to the pathologist, even in young patients.

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Invited commentary

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The authors have to be congratulated on their presentation of a huge group of 1814 breast cancer patients who underwent breast reconstruction after mastectomy in the Gustave-Roussy Institute. Four hundred forty patients had a reduction mammaplasty to achieve a more symmetrical result. In 4.5% of these patients a clinically and radiologically occult breast cancer was discovered at the time of reduction mammaplasty.

By this paper the role of reduction mammaplasty as a diagnostic and secondarily therapeutic tool in the field of breast cancer treatment is underlined. The wide access to the glandular tissue of the breast during reduction mammaplasty gives the chance of elective examination and biopsy of the so-called normal, healthy breast.

The diagnostic value of this operation should also be considered for bilateral reduction mammaplasties especially in patients with higher risk of developing breast cancer later on. The assessment of genetic factors might play a decisive role in the future in selecting patients for prophylactic removal of the glandular tissue of the breast by reduction mammaplasty.