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Reconstruction options for locally advanced breast cancer cases and their impact on the quality of life

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ABSTRACT

Introduction: Radical surgical procedures are indicated for part of the patients with locally advanced breast cancer (LABC). The improvement in the use of myocutaneous flaps allowed surgeons to perform extensive resections, a procedure that can be traumatic for women, leading to several biopsychosocial complications in a shortened survival. **Objectives:** This study aimed at understanding the effects of surgical treatment on the quality of survival of patients with guarded and unchanging prognosis. **Methodology:** The project was designed in two stages: review of medical records with a sample of 27 cases and face-to-face interviews with the administration of questionnaires in a sample of five cases among the remaining patients who underwent LABC surgery at Hospital Erasto Gaertner in Curitiba (PR). **Results:** On average, the answers obtained with the World Health Organization Quality of Life (WHOQOL-BREF) instrument were "regular" for physical, psychological, and environmental domains and "good" for the social relations domain. In the 12-item short-form survey (SF-12), the means were 45,125 points for the mental component and 40,875 points for the physical one. These values show the impact of advanced disease, hygienic surgery, and chest reconstruction on the quality of life of the patients, reflecting the biopsychosocial damage caused by LABC. **Conclusion:** The data reveal that LABC treatment is aggressive, but in patients with survival, the surgical treatment associated with chest reconstruction had surprisingly positive results in relation to quality of life.

KEYWORDS: Breast neoplasms; Quality of life; Humanization of assistance.

INTRODUCTION

Considered a public health problem by the Ministry of Health, breast cancer is the most frequent malignancy among women both worldwide and in Brazil – without taking into account non-melanoma skin tumors. In Brazil, 59,700 new cases of breast cancer are estimated for each year of the 2018–2019 biennium, with an estimated risk of 56.33 cases per 100,000 women[1].

The overall 5-year survival rate of breast cancer patients is 90%, according to the American Cancer Society. This number varies based on tumor staging. *In situ* tumors have a success rate close to 100%; in cases of disease with local involvement, this number drops to 85%; distant metastasis of the disease shows an even lower value: approximately 30%[2,3]. However, mortality is significantly higher in part of the patients with locally advanced breast cancer (LABC), and surgical treatment is often only palliative or hygienic[4].

LABC is a heterogeneous group that includes large tumors (T3 or T4), extensive nodal disease (N2 or N3), which may or may not be metastatic, and inflammatory carcinomas.

The treatment of LABC involves radical and extensive surgery, with the removal of a symbolic organ that can affect women's femininity and sexuality, leading to a series of psychological, social, and physical complications[5].

The role of reconstruction surgery in the treatment of LABC and the patient's satisfaction and quality of life are topics of growing interest. In the vast majority of cases, wide mastectomy is only possible thanks to the rotation of large muscle flaps, since there is not enough skin for the primary closure of mastectomy in LABC cases. These procedures allow the mastologist to perform extensive resections of large tumors that, in other times, would have been considered unresectable[5,6]. We underline that these procedures are chiefly chest wall reconstructions to cover extensive soft tissue lesions and not breast reconstructions[7].

Since this group of patients has reduced survival and the surgical procedure is extensive, with a long postoperative recovery period, improving their quality of life after mastectomy and chest

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wall reconstruction is very important. Therefore, the indication for oncologic resection should take into account the patient's quality of life.

Quality of life is a multifactorial concept that has been increasingly studied due to changes in health practices[8]. The World Health Organization (WHO) defines quality of life as "the individual's perception of his/her position in life in the context of the culture and value systems in which he/she lives and in relation to his/her goals, expectations, standards, and concerns"[8]. However, the literature on the analysis of quality of life in LABC cases is scarce.

OBJECTIVE

This study aimed to describe a sample of patients who underwent LABC surgical treatment, the type of reconstruction, the complications, the disease-free interval, deaths, and objective parameters of perceived quality of life.

METHODS

We analyzed all LABC patients submitted to post-treatment reconstruction at the Hospital Erasto Gaertner in Curitiba from 2014 to 2018. The Research Ethics Committee (REC) of the hospital approved this study. Patients with pathologies other than breast cancer were excluded.

The project was designed in two stages: initially, we reviewed the medical records of all cases; next, during the follow-up appointments in the plastic surgery service, the patients were invited to answer a questionnaire with the help of the researchers, who clarified any potential doubts during the reading of the questionnaire. We chose three instruments for this stage: a survey on sociodemographic, clinical, and therapeutic characteristics and aspects related to LABC surgery; a generic quality of life survey (12-item short-form survey – SF-12); and a generic quality of life survey developed by the World Health Organization (World Health Organization Quality of Life instrument – WHOQOL-BREF).

WHOQOL-BREF module

The WHOQOL-BREF module is a questionnaire used in pathologies in which pain is a critical component. It consists of 26 questions with answers that follow a 5-point scale, and the higher the score, the better the quality of life. The instrument covers four domains: physical, psychological, social relations, and environment[8,9].

SF-12 Survey

The SF-12 is a general health questionnaire first published in 1995 as part of the Medical Outcomes Study (MOS). The SF-12 assesses eight different aspects which influence the Health-Related Quality of Life (HRQoL): physical function, physical aspect, pain, general health, vitality, social function, emotional aspect, and mental health[10,11].

RESULTS

We selected 27 women with LABC between 2014 and 2018. All patients were operated by both the breast service and the plastic surgery service at the same time. All of them underwent a modified radical mastectomy with immediate chest reconstruction.

The mean age of the patients was 49 years, ranging from 22 to 86 years (Table 1). The mean lesion size at the time of resection was 138 cm^2, with the largest lesion measuring 30 cm × 30 cm (Table 2).

The predominant histological type was ductal carcinoma with 20 cases (74% of the sample), followed by spindle cell neoplasm and ductal-lobular carcinoma with two cases each, and sarcoma, adenoid cystic carcinoma, and malignant *phyllodes* tumor with one case each. Regarding mastectomy laterality, two cases were bilateral, 17 were on the right side, and eight on the left (Table 1).

The staging showed 13 patients with distant metastases (48%), and, in these cases, the purpose of surgical resection was exclusively hygienic.

Regarding the immunohistochemical pattern, 15 patients had a triple-negative profile (estrogen receptor-, progesterone receptor-, and human epidermal growth factor receptor 2 – HER2-negative) (Table 3).

The most commonly used form of reconstruction was chest wall reconstruction with a fleur-de-lis latissimus dorsi flap in 12 cases, followed by the V-Y flap in 11 cases (Figures 1 and 2).

Chest reconstruction was predominantly performed using extensive latissimus dorsi flaps (92.5%), allowing a greater transference of back skin; among its variants, fleur-de-lis was the most used technique, with 12 cases (44.4%) (Figure 3); V-Y was the second most used technique, with 11 cases (40.7%); and island flap was used in two patients (7.4%). In addition to the latissimus dorsi technique, the transverse rectus abdominis myocutaneous (TRAM) flap was also used in two patients (7.4%) (Table 2).

All patients had complete primary closure of their donor area without needing skin grafting.

All cases were monitored after discharge. The most common complications were seroma and dehiscence (12 patients). Despite the extensive oncologic resection, 14 of the 27 patients progressed to distant metastasis and/or local recurrence (51.9%) until the time of data collection, and 15 died (55.5% mortality) (Chart 1), with a mean survival of 240.7 days.

Chemotherapy was the most used complementary, adjuvant, and neoadjuvant treatment; 20 patients benefited from this treatment, eight of whom received associated radiotherapy and two received associated radiotherapy and hormone therapy. Three patients received only radiotherapy, and four received no complementary treatment (Table 1).

No deaths were related to procedures, surgical site infections, or chest wall instability; all deaths were due to disease progression.

Regarding the quality of life survey, out of the 12 patients who survived, seven (58.3%) refused to participate due to advanced disease or exhaustion caused by the treatment. The researchers

invited the remaining five patients to answer questions about quality of life aspects after the chest reconstruction procedure.

The SF-12 survey was administered, resulting in two scores – one for the mental component, with an average of 40,875, and another for the physical component, with an average of 45,125.

Next, the researchers administered the WHOQOL-BREF instrument, specific for pathologies with significant pain component.

DISCUSSION

Age stands out as the main known risk factor for breast cancer in women. The incidence of breast cancer increases significantly with age[12]; however, the disease tends to be more aggressive in younger women[13]. Our study found that 48% of LABC cases occurred in under-50-year-old women, and 11% of the patients were younger than 35 years. The death rate in under-50-year-old women was 77%, against 21% in women aged 50 years or older. In the subgroup of women under 35 years of age, mortality was 100%. This fact confirms the epidemiological characteristic of breast cancer: the risk of developing the disease increases with time due to aging and exposure to carcinogens; on the other hand, lower age tends to be a factor of worse prognosis, especially in under-35-year-old women, as observed in our study[12,13].

In 48% of the patients, the surgery was only hygienic and for pain control, as they already had distant metastases.

The surgical treatment for these advanced tumors consists of extensive radical mastectomy and large skin resections, leading to significant rib cage deformities and requiring

Table 1. General characteristics of locally advanced breast cancer (LABC) patients who underwent surgical treatment in the 2014–2018 period.

Case	Age	Tumor Type	Staging	Complementary Treatment	Recurrence	Death
1	22	Ductal Carcinoma	T4N0M0	CT	No	Yes
2	32	Ductal-lobular Carcinoma	T4N0M1	CT + RT	Yes	Yes
3	33	Ductal Carcinoma	T4N3M1	CT	Yes	Yes
4	36	Ductal Carcinoma	T4N1M0	CT + HT + RT	No	No
5	41	Spindle Cell Neoplasm	T4N0M1	No	No	Yes
6	41	Ductal Carcinoma	T4N0M0	CT	No	No
7	42	Ductal-lobular Carcinoma	T4N1M1	CT	Yes	Yes
8	42	Ductal Carcinoma	T4N2M1	CT + HT	No	Yes
9	43	Ductal Carcinoma	T4N1M1	CT	No	Yes
10	43	Spindle Cell Neoplasm	T4N0M0	RT	No	No
11	43	Ductal Carcinoma	T4N2M1	CT	Yes	Yes
12	44	Ductal Carcinoma	T4N3M1	CT + RT	No	Yes
13	46	Ductal Carcinoma	T4N2M1	CT	Yes	Yes
14	50	Malignant *Phyllodes* Tumor	T4N0M0	No	Yes	Yes
15	52	Pleomorphic Sarcoma	T4N0M0	CT	No	No
16	52	Ductal Carcinoma	T4N1M0	CT + RT	Yes	No
17	52	Ductal Carcinoma	T4N2M1	No	Yes	Yes
18	54	Ductal Carcinoma	T4N1M1	CT + RT	Yes	No
19	57	Ductal Carcinoma	T4N2M0	CT	No	No
20	57	Ductal Carcinoma	T4N3M1	CT + RT	Yes	Yes
21	58	Ductal Carcinoma	T4N0M0	CT + RT	No	No
22	61	Adenoid Cystic Carcinoma of the Breast	T4N0M0	RT	Yes	No
23	62	Ductal Carcinoma	T4N3M0	CT + RT	No	No
24	63	Ductal Carcinoma	T4N1M0	CT	Yes	Yes
25	66	Ductal Carcinoma	T4N0M0	No	No	No
26	68	Ductal Carcinoma	T4N2M1	CT + RT	Yes	Yes
27	86	Ductal Carcinoma	T4N2M0	RT	Yes	No

CT: chemotherapy; RT: radiotherapy; HT: hormone therapy.

Table 2. Surgical profile of patients submitted to surgical treatment for locally advanced breast cancer (LABC) in the 2014–2018 period.

Case	Reconstruction Method	Resection	Lesion area (cm^2)	Lesion side	Complications
1	V-Y LD	R0	900	Right	No
2	Fleur-de-Lis LD	R0	170	Left	Necrosis + Dehiscence
3	TRAM	R0	45.5	Right	Dehiscence
4	V-Y LD	R1	144	Right	No
5	TRAM	R0	130	Left	Necrosis
6	Fleur-de-Lis LD	R0	42	Left	No
7	Fleur-de-Lis LD	R0	27.3	Right	No
8	V-Y LD	R0	90	Left	Seroma + Necrosis + Dehiscence
9	Fleur-de-Lis LD	R0	96	Right	Dehiscence
10	V-Y LD	R0	217	Right	No
11	Fleur-de-Lis LD	R1	225	Left	No
12	Fleur-de-Lis LD	R0	13.44	Left	Hematoma
13	Fleur-de-Lis LD	R0	67.6	Right	No
14	V-Y LD	R0	360	Right	No
15	Transverse Island LD	R0	140	Right	No
16	V-Y LD	R0	132	Right	No
17	V-Y LD	R1	84	Left	No
18	Fleur-de-Lis LD	R0	28	Right	Seroma + Dehiscence
19	V-Y LD	R0	90	Right	No
20	V-Y LD	R2	100	Right	No
21	V-Y LD	R0	102	Right	Seroma
22	Transverse Island LD	R0	77	Right	Dehiscence
23	Fleur-de-Lis LD	R0	7	Left	Dehiscence
24	V-Y LD	R0	85	Right	No
25	Fleur-de-Lis LD	R0	270	Right	Dehiscence
26	Fleur-de-Lis LD	R1	32.5	Left	Seroma
27	Fleur-de-Lis LD	R0	39	Right	No

LD: latissimus dorsi flap; TRAM: transverse rectus abdominis myocutaneous.



Figure 1. Right chest reconstruction with V-Y latissimus dorsi flap before and after radical mastectomy.

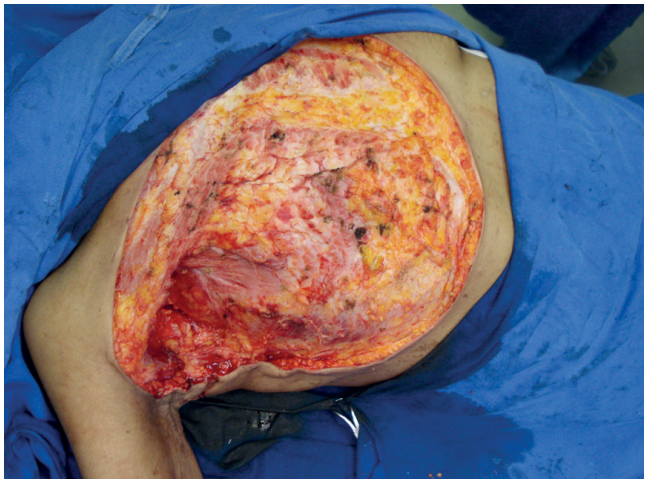


Figure 2. Intraoperative image of the right chest reconstruction with V-Y latissimus dorsi flap.

complex reconstructions[14,15]. The myocutaneous flap is the first option to cover the resulting chest wall deformities, as it allows adequate coverage of soft tissues with acceptable morbidity of the donor area. Guidelines recommend offering reconstruction to all breast cancer patients and performing it immediately in the service[16].

Several forms of chest wall reconstruction can be employed for repairing defects after the resection of breast tumors. Particularly in these LABC cases, skin and soft tissue deficiencies are very extensive, requiring large flaps. The latissimus dorsi flap in its V-Y and fleur-de-lis variations can offer more tissue to these defects, with excellent blood supply[17-19]. The incidence of total complications per patient identified in our study was 44.4%. This finding is compatible with the literature[20], especially in surgical wound complications, which can have a detrimental effect on the remaining treatment (delay in radiotherapy and chemotherapy).

In this study, all women were treated by the public health system (*Sistema Único de Saúde* – SUS) and were diagnosed at an advanced stage, perhaps due to the longer interval between suspicion and diagnostic confirmation and the lower frequency of mammograms performed compared to the private healthcare system. Nonetheless, we do not have sufficient data about the period from the diagnosis until the arrival at the reference hospital to confirm this hypothesis.

Concerning the quality of life, the BREAST-Q questionnaire is the best known and the most widely used in evaluations of breast surgeries, but we did not adopt it in our study because we performed chest reconstruction, not breast reconstruction. Therefore, we opted for the SF-12 and WHOQOL surveys.

Seven patients refused to participate in the interview, which corresponds to 58.3% of the survivors. They expressed negative feelings and aversion to returning to the hospital environment, associated with moments of distress and suffering caused by the disease.

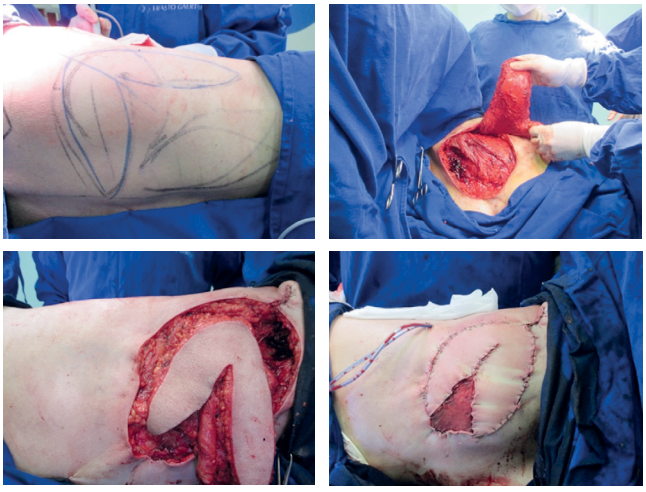


Figure 3. Radical mastectomy with chest reconstruction using the fleur-de-lis latissimus dorsi technique.

Table 3. Immunohistochemical profile of patients who underwent surgical treatment for locally advanced breast cancer (LABC) in the 2014–2018 period.

Case	PR	ER	HER2	KI67 (%)
1	NEG	NEG	NEG	30
2	NEG	NEG	NEG	80
3	POS	POS	NEG	30
4	NEG	NEG	POS	30
5	NEG	NEG	NEG	85
6	NEG	NEG	NEG	60
7	NEG	NEG	NEG	05
8	NEG	NEG	NEG	-
9	POS	POS	NEG	20
10	NEG	NEG	NEG	30
11	POS	POS	NEG	10
12	NEG	NEG	NEG	80
13	NEG	POS	NEG	67
14	POS	POS	POS	40
15	NEG	NEG	NEG	80
16	NEG	NEG	NEG	-
17	NEG	NEG	POS	50
18	NEG	NEG	POS	20
19	NEG	NEG	NEG	70
20	NEG	NEG	NEG	-
21	POS	POS	NEG	100
22	NEG	NEG	NEG	-
23	NEG	NEG	POS	35
24	NEG	NEG	NEG	-
25	NEG	NEG	NEG	90
26	POS	POS	POS	-
27	POS	POS	NEG	60

PR: progesterone receptors; ER: estrogen receptors; HER2: human epidermal growth factor receptor 2; NEG: negative; POS: positive; Ki67: cancer cell proliferation marker.

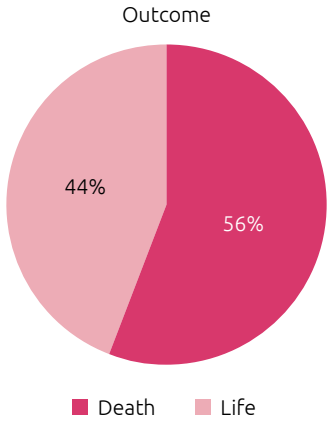


Chart 1. Outcome of locally advanced breast cancer (LABC) patients submitted to surgical treatment in the 2014–2018 period, considering all deaths until data collection.

The patients who answered the surveys reported physical and emotional damages in the SF-12 survey concerning breast cancer treatment, which was expected given the length of the treatment.

As for the WHOQOL-BREF score, we identified loss in the physical domain, responsible for measuring pain and discomfort, energy and fatigue, and activities of daily living, as well as in the psychological domain. The social relations domain – personal relationships, social support, and sexual activity – was the most preserved and categorized as "good." This result surprised us because our hypothesis was of loss in all aspects. This finding leads us to assume the surgery can be beneficial, mainly for the local control of the tumor and wound, allowing greater social interaction.

CONCLUSION

LABC treatment is a challenge in several aspects: oncologic, reconstructive, and quality of life. Moreover, its high mortality also represents a challenge. In the sample analyzed in this study, mortality was 51.9%. Despite the large oncologic resections needed in these patients, several flaps can be used for chest wall reconstruction, particularly the latissimus dorsi flap in its V-Y and fleur-de-lis variations, which is capable of closing extensive defects.

The quality of life assessment in this study was limited by the high mortality and the low adherence to the surveys, which restricted their interpretation. Nevertheless, we found signs of improvement in social relations. It is necessary to continue evaluating LABC patients to determine the benefit of such extensive surgery in this group.

AUTHORS' CONTRIBUTIONS

A.K.G.: Conceptualization; Writing – review & editing; Supervision; Methodology; Project administration.
A.T.D.I.: Conceptualization; Writing – original draft; Data curation; Formal Analysis; Methodology; Project administration.
S.K.: Data curation; Formal Analysis.
L.S.V.: Investigation.
A.L.B.P.: Investigation; Resources.
D.R.P.: Investigation.
K.S.M.P.: Supervision.

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