



**HAL**  
open science

## Evaluation of quality of life after breast reconstruction using an autologous latissimus dorsi myocutaneous flap

E. de Gournay, Franck Bonnetain, H. Tixier, C. Loustalot, S. Dabakuyom, J. Cuisenier

► **To cite this version:**

E. de Gournay, Franck Bonnetain, H. Tixier, C. Loustalot, S. Dabakuyom, et al.. Evaluation of quality of life after breast reconstruction using an autologous latissimus dorsi myocutaneous flap. *EJSO - European Journal of Surgical Oncology*, 2010, 36 (6), pp.520. 10.1016/j.ejso.2010.04.008 . hal-00599225

**HAL Id: hal-00599225**

**<https://hal.science/hal-00599225>**

Submitted on 9 Jun 2011

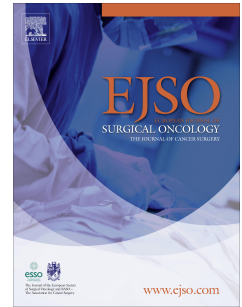
**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Accepted Manuscript

Title: Evaluation of quality of life after breast reconstruction using an autologous latissimus dorsi myocutaneous flap

Authors: E. de Gournay, F. Bonnetain, H. Tixier, C. Loustalot, S. Dabakuyom, J. Cuisenier



PII: S0748-7983(10)00096-X

DOI: [10.1016/j.ejso.2010.04.008](https://doi.org/10.1016/j.ejso.2010.04.008)

Reference: YEJSO 2957

To appear in: *European Journal of Surgical Oncology*

Received Date: 6 January 2010

Revised Date: 3 February 2010

Accepted Date: 12 April 2010

Please cite this article as: de Gournay E, Bonnetain F, Tixier H, Loustalot C, Dabakuyom S, Cuisenier J. Evaluation of quality of life after breast reconstruction using an autologous latissimus dorsi myocutaneous flap, *European Journal of Surgical Oncology* (2010), doi: 10.1016/j.ejso.2010.04.008

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**Evaluation of quality of life after breast reconstruction using an autologous latissimus dorsi myocutaneous flap**

**E. DE GOURNAY <sup>a,c</sup> (M.D), F. BONNETAIN <sup>b,c</sup> (M.D), H. TIXIER <sup>a,c,✉</sup> (M.D), C. LOUSTALOT <sup>a</sup> (M.D), S. DABAKUYO <sup>b</sup> (PharmD, PhD) and J. CUISENIER (M.D, PhD) <sup>a</sup>.**

<sup>a</sup> Department of Oncological Surgery, Georges François Leclerc Cancer Care Center, 1, rue du Professeur Marion, FR-21000, Dijon, France.

<sup>b</sup> Biostatistics and Epidemiology Unit, Georges François Leclerc Cancer Care Center, 1, rue du Professeur Marion, FR-21000, Dijon, France EA 4184.

<sup>c</sup> Contributed equally

✉ **Corresponding author at:**

Department of Oncological Surgery,

Georges François Leclerc Anticancer Center,

1, rue du Professeur Marion, FR-21000,

Dijon, France. Tel.: + 33 380 737 500

e-mail: [herve\\_tixier@yahoo.fr](mailto:herve_tixier@yahoo.fr)

**Abstract**

**Aims:** To evaluate the patients' satisfaction with breast reconstruction using the autologous latissimus dorsi technique and the impact of the procedure on the quality of life and body image of women who had mastectomy for breast cancer.

**Methods:** A retrospective transversal study was conducted at the Georges François Leclerc Cancer Care Center in Dijon, France. From 1990 to 2008, 193 women underwent reconstruction (RW), among these, 141 were matched for age at diagnosis and the date of the mastectomy with women who did not undergo reconstruction (NRW) identified using data from the Côte d'Or breast cancer registry. Questionnaires concerning quality of life, body image and satisfaction (MBROS-S, MBROS-BI, EORTC QLQ-C30, EORTC QLQ-BR23) were sent through the post following surgery.

**Results:** The overall response rate was 77% and the mean (MBROS-S) satisfaction score was 3.36. The quality of life (EORTC QLQ-C30, EORTC QLQ-BR23) in RW was no better than that in NRW, but body image was better ( $p=0.0247$ ) especially before 60 years ( $p=0.0192$ ), in obese patients ( $p=0.03$ ) and when the breasts of RW were heavy ( $p=0.0197$ ). Moreover, when the time from the mastectomy was less than 4 years, body image ( $p=0.0008$ ) and the sexual activity score ( $p=0.0078$ ) were higher in RW.

**Conclusions:** The level of satisfaction was higher in RW, and breast reconstruction made a strong contribution in terms of improvement in body image. A prospective study to evaluate quality of life in the long term is now necessary.

**240 words**

**Key words:** Breast reconstruction, cancer, quality of life

## **Introduction**

In France, breast reconstruction using the latissimus dorsi flap whether autologous or associated with an implant is now the standard procedure following radical mastectomy for breast cancer (Patey).

The indications and the esthetic results are now well known (1). The principal aim of this so-called reconstructive surgery is not only to improve the woman's body image, but also indirectly her health-related quality of life in its physical, social, psychic and sexual dimensions. The efficacy of the therapy for and management of cancer must be based on two main judgment criteria: survival and health-related quality of life. This multidimensional measurement is recognized as the main judgment criterion by the Food and Drug Administration and the ASCO (2-5).

However, there are no data in the literature that make it possible to judge the efficacy of this type of surgery in terms of improvement in quality of life.

We propose here to evaluate on the one hand the characteristics of patients who benefit from breast reconstruction and on the other hand the satisfaction of these women with reconstructed breasts (RW) by quantifying the impact of the reconstruction on their body image and quality of life.

## **Patients and methods**

### ***Patients and Study design***

This is a case controlled retrospective study, conducted at the Georges François Leclerc Cancer Care Center in Dijon, France from January 1990 to March 2008 (18 years). It includes women who underwent mastectomy for non-metastatic breast cancer operated on by the same senior surgeon. The minimum follow-up was 6 months after the operation.

The RW group comprised 193 patients who were still alive in July 2008 who had undergone mastectomy between January 1990 and March 2008 with immediate or deferred breast reconstruction using autologous latissimus dorsi flap with or without an implant.

The control group comprised women without breast reconstruction (NRW) recorded in the Côte d'Or breast cancer database. The group included 895 patients who were alive in July 2008 who had undergone mastectomy in the same center after January 1990, but without subsequent reconstruction. One hundred and forty-one RW were matched for age at diagnosis as well as for the date of mastectomy with NRW. Quality of life and body image questionnaires (MBROS-BI, EORTC QLQ-C30, EORTC QLQ-BR23) were sent through the post to 193 RW and to 141 NRW. A satisfaction questionnaire (MBROS-S) was also sent to the RW.

The clinical characteristics and the therapeutic management of patients were collected. For patients with breast reconstruction, the reconstruction technique and any complications were recorded.

### *Quality of life*

The quality of life was evaluated using the EORTC QLQ-C30 (version 3) questionnaire and its breast cancer module BR 23, which is specific to breast cancer and has been validated in French (comprising 23 items). Internal validation of the EORTC QLQ-C30 questionnaire, comprising 30 items, make it possible to identify 15 dimensions and to calculate 15 scores: 5 scores for functional aptitude (physical capacity, aptitude to work or to accomplish all household tasks, cognitive abilities, emotional status, social status), an overall quality of life score, a financial problem score and 8 symptom scores (fatigue, nausea/vomiting, pain, dyspnea, disturbed sleep, loss of appetite, constipation, diarrhea). These scores ranged from 0 (worst) to 100 (best) (6-10).

The specific BR 23 module (11) for breast cancer comprises 23 items that make it possible to evaluate the specific characteristics: symptoms, side effects of treatment (surgery, chemotherapy...etc.), body image and sexuality from 8 scores and dimensions.

It has been completely validated (8):

- 8 items relative to the side effects of chemotherapy.
- 3 items relative to the arm-related side effects of surgery.
- 4 items relative to the breast-related side effects of surgery.
- 4 items explore body image.
- 3 items concern sexuality.
- 1 item focuses on anxiety.

### ***Satisfaction and body image***

The satisfaction and body image questionnaires from the Michigan Breast Reconstruction Outcome Study (MBROS) were sent to the RW.

The Michigan Breast Reconstruction Outcome Study satisfaction (MBROS-S) questionnaire was created by a group of experts and comprises 7 items divided into 2 scales. Five items measure the patient's overall satisfaction and 2 items measure satisfaction with the esthetic result (12). The validity of this questionnaire was tested (« face validity », « content validity » and « construct validity » as was its reliability. The questionnaire was initially published in English, but was translated into French. The validation procedures for the French version will be published in a future article.

The MBROS Body Image questionnaire (MBROS-BI) was the second questionnaire developed by the MBROS team (13). It comprises 9 items on one scale. It was developed to measure the patient's perception of her physical appearance following breast surgery. It makes it possible to calculate a body image score (BI score). This questionnaire was also translated into French.

In the case of double answers to a question, the answer was considered invalid. Answers that were doubtful or ambiguous were discussed in meetings.

### *Statistical Analyses*

Qualitative variables were described in terms of percentages, and quantitative variables in terms of means, standard deviations and medians.

Statistical analysis of data was performed using the following tests: de Student's t test or the Mann-Whitney test, for the comparison of means; Pearson's Chi-2 or Fischer's exact test for comparisons of percentages.

The different scores generated for the 2 groups of patients (reconstruction versus non-reconstruction) were compared using Mann and Whitney tests.

Sub-group analyses were done to compare scores according to age, BMI, time between reconstruction and answering the questionnaire, in RW versus NRW using Mann and Whitney tests.

In RW, quality of life scores were compared according to the type of reconstruction and according to the severity of complications using Mann and Whitney and Kruskal and Wallis tests.

Statistical analyses were carried out using Stata V8 software. The risk of bilateral type-I error was set at 5%.

### **Results**

Of the 334 eligible patients who received a questionnaire: 160 of 193 RW answered, and 95 of 141 NRW answered. Six letters were returned with the message « no longer living at this address ». These were considered lost to follow up.

In the NRW group, 9 patients were later excluded because they did not meet inclusion and



exclusion criteria. The NRW group thus comprised 86 women.

### ***Patients' characteristics***

The mean age was 55 years [33-74] for RW and 57 years [39-78] for NRW. The mean time between the questionnaire and the mastectomy was 4.8 years [1-18]. For the RW group, the mean time between the questionnaire and the breast reconstruction was 3.6 years [6 months-17 years].

The RW group included 19 immediate breast reconstructions (IBR) and 141 deferred breast reconstructions (DBR). For the latter, the mean time between the mastectomy and the reconstruction was 20.2 months [2 months-14 years].

Forty-eight women had DBR using a latissimus dorsi flap with an implant and 93 had autologous latissimus dorsi reconstruction alone. Four women had IBR using a latissimus dorsi flap and an implant, while 15 women had IBR using a latissimus dorsi flap alone.

The disease characteristics of the patients are presented in table 1. All of the disease characteristics for the two groups were comparable except with regard to tumor size, which was smaller in the RW group ( $p=0.040$ ). Generally speaking, the indications for mastectomy concerned less serious lesions in the RW group ( $p=0.018$ ), while neoadjuvant chemotherapy was more frequently prescribed in the NRW group ( $p=0.031$ ) for the same reason.

### ***Evaluation of satisfaction, of body image and of quality of life***

There was no significant difference between the RW and the NRW with regard to scores obtained for the EORTC QLQ-C30 and EORTC QLQ-BR23 questionnaires (table 2). In contrast, the results for the MBROS Body Image questionnaire (table 3) showed a significantly higher score for body image in RW than in NRW ( $p=0.0247$ ).

RW of less than 60 years had a better body image than did NRW of less than 60 years (MBROS-Body Image;  $p= 0.0192$ ), but this difference was no longer present in women over 60 years (table 4).

Women who had a mastectomy less than 4 years (48 months) before reconstruction reported a significant benefit thanks to their reconstruction compared to NRW, with a better perception of body image (MBROS-Body Image;  $p=0.0008$ ) (table 4). The same was true for the sexual activity score (EORTC QLQ-BR23;  $p=0.0078$ ). The results were not significantly different if the time between mastectomy and reconstruction was more than 4 years.

Obese RW ( $BMI \geq 30$ ) had a better body image than did obese NRW (MBROS-Body Image). The mean scores were 24.9 ( $SD=5.26$ ) and 32 ( $SD=8.28$ ) for NRW and RW, respectively ( $p= 0.03$ ). Women with heavy breasts (score  $\geq 105$ ) reported a greater improvement in body image if they had had breast reconstruction (MBROS-Body Image). The mean scores were 25.83 ( $SD=7.19$ ) and 30.13 ( $SD=7.94$ ) for NRW and RW, respectively ( $p=0.0197$ ). The results were not significantly different for a thorax circumference of less than 105 cm.

There was no significant difference in scores for the type of reconstruction or for the presence and the severity of complications. (45% all grades together)

The satisfaction of RW was explored using the MBROS-S questionnaire. The results for overall satisfaction (questions 1 to 5) ranged from 56.25 to 79.38%. Almost 8 out of 10 women said they were satisfied with their reconstruction and 6.5 out of 10 would recommend the procedure to a friend. The results for esthetic satisfaction were more mixed with 71.25% of satisfaction with suppleness to the touch, but only 32.5% for the similarity in size and appearance of the two breasts.

### ***Validation***

The MBROS-S questionnaire can generate a satisfaction score from the first 5 questions by adding together the number of positive responses. The mean score in our population was 3.36 [0-5]. Age ( $p=0.6116$ ), BMI ( $p=0.4343$ ), the severity of complications ( $p=0.0765$ ), a history of an earlier lumpectomy ( $p=0.911$ ), the type of reconstruction ( $p=0.5$ ) and the use of radiotherapy ( $p=0.1366$ ) had no significant impact on the satisfaction score.

We tested the correlation between scores for the EORTC QLQ-BR23 quality of life questionnaire and those for the MBROS-Body Image questionnaire. The correlation between these two questionnaires was positive and very strong (table 5). We also tested the correlation between the satisfaction questionnaire and the EORTC QLQ-BR23 quality of life questionnaire. The results showed a very good correlation between these two questionnaires. In particular the item body image correlated significantly with 6 of 7 questions of the MBROS (table 5). These results confirm that the internal validity of our study was good.

Finally, women who responded to the posted questionnaire were significantly older than those who did not respond. The mean ages were 51 (SD=9) and 48 (SD=8) for responding and non-responding patients, respectively ( $p=0.0174$ ). In contrast, the other general and disease characteristics in the two groups were comparable:  $t$  ( $p=0.955$ ),  $n$  ( $p=0.675$ ) grade ( $p=0.955$ ).

## **Discussion**

### ***Patient and treatment characteristics***

The overall response rate was good. In comparable quality of life studies with questionnaires sent through the post, the rate of response is generally lower (14). Overall, the two groups were comparable except for the initial size of the tumor, the indication for mastectomy and the use of neoadjuvant chemotherapy. Certain reconstructions were performed in the 1990s, which corresponds to the beginnings of this technique. Since there

was little information on the safety of the technique, only patients with a good prognosis for their cancer were selected to benefit from the technique.

### *Evaluation of body image and of quality of life*

Our study showed that body image was better in RW (MBROS-Body Image). Quality of life scores in RW and NRW, however, were comparable. There was no difference between the two groups with regard to scores for overall health, physical, psychological and social function, and for symptoms. This result is in keeping with those from other studies (15;16), notably the study conducted by Nano et al. (17), which showed the absence of any difference in quality of life but better body image in patients undergoing conservative treatments and reconstructions compared to that in patients who had mastectomy without reconstruction. The fact that the effect of reconstruction is restricted to improved body image has many factors. Body image is the psychological concept that is most affected by ablation of the breast, the essence of the feminine image. The impact of mastectomy on body image is the primordial concern of women 3 to 12 months after the mastectomy (18). However, it is difficult to separate the psychological repercussions of the announcement of the cancer and the adjuvant treatments from the psychological impact of the mastectomy (19;20). Boughton et al. (21) showed that the precise psychological consequences of surgery for breast cancer depended essentially on the personality of the individual and not on the type surgery performed. This individualistic explanation, which gives priority to the impact of the cancer rather than that of the treatment, explains why many studies fail to reveal any difference with regard to quality of life between patients undergoing mastectomy and those undergoing conservative treatments.

The benefit of reconstruction is especially appreciated in women of less than 60 years. This effect can be explained by the greater impact of mastectomy on body image and quality

of life in young women (22;23). Indeed, young women are those who most frequently request breast reconstruction(24).

For obese women, body image was better in RW: the volume of the breast is often greater and mastectomy leads to manifest asymmetry. This asymmetry is even more obvious when they are dressed because of the high insertion of breasts. Moreover, implants are not suitable for obese patients. They become unstuck with the folds of scar tissue, which are difficult to avoid in such patients, and because of their weight they tend to slip or fall. Finally, reconstruction using an autologous latissimus dorsi flap, makes it possible to harvest a larger graft of musculocutaneous-adipose tissue and therefore to perform large volume reconstructions. Symmetry can be improved by reducing the volume of the contralateral breast, and this is a source of comfort in these patients. Finally, obese patients may be less demanding than non-obese patients with regard to the esthetic quality of the reconstruction. Obese women should not be denied reconstruction surgery because of the greater risk of complications (25;26). On the contrary, they should be encouraged to benefit from this procedure. This result should be compared with that in women with large breasts since the size of the breast is often related to the body-mass index.

The impact of mastectomy on sexual activity has already been shown (12). After the immediate post-mastectomy period when sexual activity diminishes considerably, a normalization phase progressive appears. In our series, we found that sexual activity in RW improved earlier than it did in NRW. After 4 years this difference waned. The relative benefit of reconstruction has already been shown by other authors (27;28), but only during the first four years after the operation. To our knowledge, there are no data concerning the prolongation of the benefit beyond 4 years.

### ***Evaluation of satisfaction***

Generally speaking, the RW in our series were well satisfied and the degree of satisfaction was comparable to data in the literature (29;30). These good results for satisfaction were expected because such results are relatively common in the literature, but no predictive factors for satisfaction have been found. The rate of satisfaction does not depend on the esthetic result but on the degree to which the patient is involved in the reconstruction process. The better patients are informed before the operation and the greater the participation in the choice of reconstruction technique, the less they show regret in the follow-up (29;31). Anxiety and depression also play a role by diminishing the level of satisfaction (29;32).

### **Conclusion**

Breast reconstruction is now an integral part of the management of breast cancer. It does, however, still need to be evaluated. Self-image is significantly improved following reconstruction particularly in women of less than 60 years, in obese women and in those with heavy breasts. Sexual activity scores also improve in the first four years following mastectomy. A prospective study to evaluate quality of life in the long term now seems necessary to strengthen our results.

**Conflict of interest statement:** The authors have no conflicts of interest to disclose.

### **Acknowledgments**

We thank Philip Bastable for the help in revising the manuscript.

**References**

- (1) Delay E, Gounot N, Bouillot A, Zlatoff P, Rivoire M. Autologous latissimus breast reconstruction: a 3-year clinical experience with 100 patients. *Plast Reconstr Surg* 1998 Oct;102(5):1461-78.
- (2) Beitz J, Gnecco C, Justice R. Quality-of-life end points in cancer clinical trials: the U.S. Food and Drug Administration perspective. *J Natl Cancer Inst Monogr* 1996;(20):7-9.
- (3) Garcia SF, Cella D, Clauser SB, Flynn KE, Lad T, Lai JS, et al. Standardizing patient-reported outcomes assessment in cancer clinical trials: a patient-reported outcomes measurement information system initiative. *J Clin Oncol* 2007 Nov 10;25(32):5106-12.
- (4) Johnson JR, Temple R. Food and Drug Administration requirements for approval of new anticancer drugs. *Cancer Treat Rep* 1985 Oct;69(10):1155-9.
- (5) Lipscomb J, Donaldson MS, Arora NK, Brown ML, Clauser SB, Potosky AL, et al. Cancer outcomes research. *J Natl Cancer Inst Monogr* 2004;(33):178-97.
- (6) Aaronson NK, Ahmedzai S, Bergman B, Bullinger M, Cull A, Duez NJ, et al. The European Organization for Research and Treatment of Cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. *J Natl Cancer Inst* 1993 Mar 3;85(5):365-76.
- (7) Anderson RT, Aaronson NK, Wilkin D. Critical review of the international assessments of health-related quality of life. *Qual Life Res* 1993 Dec;2(6):369-95.
- (8) Fayers PM, Aaronson NK, Bjordal K, Blazeby J. *The EORTC QLCC30 Scoring Manual*. Third Edition ed. Brussels: 2001.
- (9) Hjermstad MJ, Fossa SD, Bjordal K, Kaasa S. Test/retest study of the European Organization for Research and Treatment of Cancer Core Quality-of-Life Questionnaire. *J Clin Oncol* 1995 May;13(5):1249-54.
- (10) Ringdal GI, Ringdal K. Testing the EORTC Quality of Life Questionnaire on cancer patients with heterogeneous diagnoses. *Qual Life Res* 1993 Apr;2(2):129-40.
- (11) Sprangers MA, Groenvold M, Arraras JI, Franklin J, te VA, Muller M, et al. The European Organization for Research and Treatment of Cancer breast cancer-specific quality-of-life questionnaire module: first results from a three-country field study. *J Clin Oncol* 1996 Oct;14(10):2756-68.
- (12) Alderman AK, Kuhn LE, Lowery JC, Wilkins EG. Does patient satisfaction with breast reconstruction change over time? Two-year results of the Michigan Breast Reconstruction Outcomes Study. *J Am Coll Surg* 2007 Jan;204(1):7-12.
- (13) Wilkins EG, Cederna PS, Lowery JC, Davis JA, Kim HM, Roth RS, et al. Prospective analysis of psychosocial outcomes in breast reconstruction: one-year postoperative results from the Michigan Breast Reconstruction Outcome Study. *Plast Reconstr Surg* 2000 Oct;106(5):1014-25.

- (14) Moore TS, Farrell LD. Latissimus dorsi myocutaneous flap for breast reconstruction: long-term results. *Plast Reconstr Surg* 1992 Apr;89(4):666-72.
- (15) Nicholson RM, Leinster S, Sassoon EM. A comparison of the cosmetic and psychological outcome of breast reconstruction, breast conserving surgery and mastectomy without reconstruction. *Breast* 2007 Aug;16(4):396-410.
- (16) Rowland JH, Desmond KA, Meyerowitz BE, Belin TR, Wyatt GE, Ganz PA. Role of breast reconstructive surgery in physical and emotional outcomes among breast cancer survivors. *J Natl Cancer Inst* 2000 Sep 6;92(17):1422-9.
- (17) Nano MT, Gill PG, Kollias J, Bochner MA, Malycha P, Winefield HR. Psychological impact and cosmetic outcome of surgical breast cancer strategies. *ANZ J Surg* 2005 Nov;75(11):940-7.
- (18) Maguire GP, Lee EG, Bevington DJ, Kuchemann CS, Crabtree RJ, Cornell CE. Psychiatric problems in the first year after mastectomy. *Br Med J* 1978 Apr 15;1(6118):963-5.
- (19) Arora NK, Gustafson DH, Hawkins RP, McTavish F, Cella DF, Pingree S, et al. Impact of surgery and chemotherapy on the quality of life of younger women with breast carcinoma: a prospective study. *Cancer* 2001 Sep 1;92(5):1288-98.
- (20) Pandey M, Thomas BC, Ramdas K, Ratheesan K. Early effect of surgery on quality of life in women with operable breast cancer. *Jpn J Clin Oncol* 2006 Jul;36(7):468-72.
- (21) Boughton B. Emotional outcome after breast surgery is highly individual. *J Natl Cancer Inst* 2000 Sep 6;92(17):1375-6.
- (22) Vinokur AD, Threatt BA, Vinokur-Kaplan D, Satariano WA. The process of recovery from breast cancer for younger and older patients. Changes during the first year. *Cancer* 1990 Mar 1;65(5):1242-54.
- (23) Schover LR. Sexuality and body image in younger women with breast cancer. *J Natl Cancer Inst Monogr* 1994;(16):177-82.
- (24) Keith DJ, Walker MB, Walker LG, Heys SD, Sarkar TK, Hutcheon AW, et al. Women who wish breast reconstruction: characteristics, fears, and hopes. *Plast Reconstr Surg* 2003 Mar;111(3):1051-6.
- (25) Alderman AK, Wilkins EG, Kim HM, Lowery JC. Complications in postmastectomy breast reconstruction: two-year results of the Michigan Breast Reconstruction Outcome Study. *Plast Reconstr Surg* 2002 Jun;109(7):2265-74.
- (26) Lin KY, Johns FR, Gibson J, Long M, Drake DB, Moore MM. An outcome study of breast reconstruction: presurgical identification of risk factors for complications. *Ann Surg Oncol* 2001 Aug;8(7):586-91.
- (27) Rubino C, Figus A, Loretto L, Sechi G. Post-mastectomy reconstruction: a comparative analysis on psychosocial and psychopathological outcomes. *J Plast Reconstr Aesthet Surg* 2007;60(5):509-18.



- (28) Al-Ghazal SK, Fallowfield L, Blamey RW. Comparison of psychological aspects and patient satisfaction following breast conserving surgery, simple mastectomy and breast reconstruction. *Eur J Cancer* 2000 Oct;36(15):1938-43.
- (29) Sheehan J, Sherman KA, Lam T, Boyages J. Association of information satisfaction, psychological distress and monitoring coping style with post-decision regret following breast reconstruction. *Psychooncology* 2007 Apr;16(4):342-51.
- (30) Tykka E, sko-Seljavaara S, Hietanen H. Patients' satisfaction with breast reconstruction and reduction mammoplasty. *Scand J Plast Reconstr Surg Hand Surg* 2001 Dec;35(4):399-405.
- (31) Contant CM, van Wersch AM, Wiggers T, Wai RT, van Geel AN. Motivations, satisfaction, and information of immediate breast reconstruction following mastectomy. *Patient Educ Couns* 2000 Jun;40(3):201-8.
- (32) Roth RS, Lowery JC, Davis J, Wilkins EG. Psychological factors predict patient satisfaction with postmastectomy breast reconstruction. *Plast Reconstr Surg* 2007 Jun;119(7):2008-15.

**Figures Legends:**

**Table 1:** Oncological characteristics of patients

**Table 2:** Comparison of QLQ C30 and Br23 Quality of life scores between women with and without breast reconstruction.

**Table 3:** Results of the MBROS-Body Image questionnaire

**Table 4:** QLQ-C30, QLQ-BR23 and MBROS-Body Image Scores according to age and time from mastectomy

**Table 5:** Correlations between questionnaires.

ACCEPTED MANUSCRIPT

Table 1: Oncological characteristics of patients

		Without Reconstruction (N=86)	With Reconstruction (N=160)	Total (N=246)	p
Stage T	1	21	58	79	<b>0.04</b>
	2	36	48	84	
	3	9	16	25	
	4	7	4	11	
	<i>Missing Data / NA</i>	13	34	47	
Stage N	0	33	70	103	0.167
	1	41	58	99	
	<i>Missing data / NA</i>	12	32	44	
Pathology	Infiltrating ductal	55	108	163	0.258
	Infiltrating lobular	16	17	33	
	Infiltrating ductal and infiltrating lobular	2	1	3	
	In situ ductal alone	9	24	33	
	Other	2	3	5	
	<i>Missing data</i>	2	7	9	
Indication for mastectomy	Size of the tumor	26	26	52	<b>0.018</b>
	Multifocal aspect	18	39	57	
	In situ carcinoma	15	41	56	
	Infiltrating recurrence	10	32	42	
	Positive surgical margins on lumpectomy	6	8	14	
	Prophylaxis	0	1	1	
	Centre of the breast / behind the nipple	9	5	14	
	Other cancer	1	1	2	
	<i>Missing data</i>	1	7	8	
Neoadjuvant chemotherapy	No	52	113	165	<b>0.031</b>
	Yes	22	23	45	
	<i>Missing data</i>	12	24	36	
Adjuvant chemotherapy	No	29	56	85	0.844
	Yes	45	82	127	
	<i>Missing data</i>	12	22	34	
Radiotherapy	No	22	56	78	0.161
	Yes	62	104	166	
	<i>Missing data</i>	2	0	2	
Hormone therapy	No	17	42	59	0.287
	Yes	57	99	156	
	<i>Missing data</i>	12	19	31	
Sentinel lymph node	No	71	136	207	0.655
	Yes	13	21	34	
	<i>Missing data</i>	2	3	5	
Axillary clearance	No	12	29	41	0.422
	Yes	72	129	201	
	<i>Missing data</i>	12	2	4	
Recurrence	No	85	156	241	0.66
	Yes	1	4	5	
Development of metastases	No	80	155	235	0.2
	Yes	6	5	11	

Table 2: Comparison of QLQ C30 and Br23 Quality of life scores between NRW and RW

NRW							RW							m2-m1	p value
	N	mean (m1)	Standard deviation	median	min	max	N	mean (m2)	Standard deviation	median	min	max			
<b>QLQ-C30</b>															
Overall health	82	65.85	23.00	66.67	16.67	100.00	158	70.46	21.84	75.00	0.00	100.00	4.61	0.1063	
Physical function	84	84.05	17.38	90.00	6.67	100.00	160	84.82	15.11	86.67	20.00	100.00	0.77	0.8248	
Everyday activities	85	84.31	22.47	100.00	0.00	100.00	160	77.81	26.94	83.33	0.00	100.00	-6.50	0.0766	
Emotional function	82	75.41	25.89	83.33	0.00	100.00	158	70.75	26.90	75.00	0.00	100.00	-4.66	0.1534	
Cognitive function	82	80.89	20.14	83.33	0.00	100.00	158	81.33	25.40	83.34	0.00	100.00	0.44	0.2249	
Social function	82	83.33	23.13	100.00	0.00	100.00	159	83.75	24.16	100.00	0.00	100.00	0.42	0.6303	
Fatigue	85	26.34	21.91	22.22	0.00	100.00	160	31.98	29.02	33.33	0.00	100.00	5.64	0.3227	
Nausea	85	5.49	15.08	0.00	0.00	66.67	160	6.04	13.92	0.00	0.00	66.66	0.55	0.3733	
Pain	85	20.78	25.05	16.67	0.00	100.00	160	27.19	27.58	16.67	0.00	100.00	6.41	0.0745	
Dyspnea	84	21.43	26.20	0.00	0.00	100.00	160	17.29	27.20	0.00	0.00	100.00	-4.14	0.0902	
Insomnia	85	29.41	33.89	33.33	0.00	100.00	159	34.80	37.38	33.33	0.00	100.00	5.39	0.3681	
Loss of appetite	85	5.88	18.67	0.00	0.00	100.00	159	6.08	16.71	0.00	0.00	100.00	0.20	0.6668	
Constipation	82	14.63	22.28	0.00	0.00	66.67	158	18.14	29.29	0.00	0.00	100.00	3.51	0.6928	
Diarrhea	81	10.29	22.76	0.00	0.00	100.00	156	5.77	16.58	0.00	0.00	100.00	-4.52	0.1153	
Financial problems	82	9.76	20.61	0.00	0.00	100.00	158	12.23	26.70	0.00	0.00	100.00	2.47	0.856	
<b>QLQ-BR23</b>															
Body image	84	65.94	32.70	75.00	0.00	100.00	159	59.87	33.30	66.67	0.00	100.00	-6.07	0.178	
Sexual activity	77	73.38	26.25	66.67	0.00	100.00	149	68.12	27.80	66.67	0.00	100.00	-5.26	0.1789	
Sexual pleasure	44	44.70	33.68	33.33	0.00	100.00	87	38.31	28.54	33.33	0.00	100.00	-6.39	0.2577	
Future perspectives	83	53.82	34.07	66.67	0.00	100.00	157	51.80	37.62	66.67	0.00	100.00	-2.02	0.6847	
Side effects of the systemic therapy	85	19.72	17.58	19.05	0.00	80.95	160	18.99	17.54	14.29	0.00	80.95	-0.73	0.7359	
Breast symptoms	84	15.58	15.99	8.33	0.00	83.33	158	19.54	22.01	16.67	0.00	100.00	3.96	0.5398	
Arm symptoms	83	22.36	22.37	22.22	0.00	100.00	157	23.99	25.91	11.11	0.00	100.00	1.63	0.9562	
Hair loss	33	51.52	43.37	33.33	0.00	100.00	45	36.30	40.09	33.33	0.00	100.00	-15.22	0.1164	

Table 3: Results of the MBROS-Body Image questionnaire

The results for each question were calculated, and for the Body Image score, the higher the mean, the better the body image.

	NRW			RW			m2-m1	p
	N	Mean (m1)	Standard deviation	N	Mean (m2)	Standard deviation		
Question 1	82	3.32	1.09	158	3.59	1.09	0.27	0.0674
Question 2	82	3.32	1.02	157	3.56	1.1	0.24	0.0969
Question 3	83	2.58	1.31	153	3.24	1.15	0.66	<b>&lt;0.0001</b>
Question 4	85	3.34	1.05	156	3.48	1.1	0.14	0.3398
Question 5	82	2.43	1.17	149	2.69	1.16	0.26	0.0985
Question 6	83	3.12	1.34	157	3.22	1.3	0.1	0.5475
Question 7	80	2.03	1.18	154	2.83	1.04	0.8	<b>&lt;0.0001</b>
Question 8	56	2.59	1.06	107	3.04	0.99	0.45	<b>0.0081</b>
Question 9	61	2.1	1.15	128	2.22	1.3	0.12	0.7805
<b>Body Image</b>	50	26.84	7.27	95	29.86	7.80	3.02	<b>0.0247</b>

MBROS-Body image questionnaire

Question 1: I feel in good health

Question 2: I like the way clothes (tee-shirts, blouses) fit me

Question 3: I like the way I look in my underwear

Question 4: My bra is comfortable

Question 5: I feel attractive

Question 6: I think about my cancer when I look at my breasts

Question 7: I like the way my breasts look

Question 8: My partner likes the way my breasts look

Question 9: I am concerned about the appearance of my breasts during sexual intercourse

Table 4: QLQ-C30, QLQ-BR23 and MBROS-Body Image Scores

	NRW			RW			m2-m1	p
	N	Mean (m1)	Standard deviation	N	Mean (m2)	Standard deviation		
<b>According to age</b>								
<b>EORTC QLQ-C30</b>								
Overall health								
≤60years	65	66.03	21.92	135	69.57	22.43	3.54	0.2145
>60years	17	65.2	27.52	23	75.72	17.57	10.52	0.1483
<b>EORTC QLQ-BR23</b>								
Body image								
≤60years	68	34.31	32.66	136	59.29	33.10	-6.4	0.1952
>60years	16	32.99	33.94	23	63.29	35.06	-3.72	0.8175
Sexual activity								
≤60years	64	29.17	26.39	127	33.20	28.21	4.03	0.3589
>60years	13	14.1	22.41	22	24.24	24.52	10.14	0.1689
Sexual pleasure								
≤60years	37	58.56	33.71	76	63.16	29.10	4.6	0.456
>60years	7	38.1	29.99	11	51.52	22.92	13.42	0.2979
<b>MBROS Body Image</b>								
≤60years	44	26.43	7.32	84.00	29.79	7.74	3.36	<b>0.0192</b>
>60years	6	29.83	6.74	11	30.45	8.68	0.62	0.8816
<b>EORTC QLQ-C30</b>								
Overall health								
≤48months	46	62.86	24.2	72	68.4	19.07	5.54	0.169
>48months	36	69.68	21.1	86	72.19	23.9	2.51	0.3682
<b>According to time since mastectomy</b>								
<b>EORTC QLQ-BR23</b>							0	
Body image							0	
≤48months	48	62.73	35.83	74	56.46	31.95	-6.27	0.2167
>48months	36	70.22	27.91	85	62.84	34.34	-7.38	0.3871
Sexual activity							0	
≤48months	45	23.70	26.71	72	36.11	25.64	12.41	<b>0.0078</b>
>48months	32	30.73	25.44	77	27.92	29.30	-2.81	0.4637
Sexual pleasure							0	
≤48months	24	52.78	39.22	48	63.89	25.57	11.11	0.1526
>48months	20	58.33	26.21	39	58.97	31.96	0.64	0.9387
<b>MBROS Body Image</b>							0	
≤48months	28	24.11	6.31	26.00	30.02	7.48	5.91	<b>0.0008</b>
>48months	22	30.32	7.03	49	29.71	8.17	-0.61	0.7650

Table 5: Correlations between questionnaires

Correlation between the Body Image score and certain items of the QLQ-BR23								
		Body Image Score						
		rho				p		
EORTC QLQ-BR23								
Body image		0.6055				<0.0001		
Sexual activity		0.2751				0.001		
Sexual pleasure		0.2628				0.0093		
Future perspectives		0.4713				<0.0001		
Correlation between the MBROS satisfaction questionnaire and certain items of the EORTC QLQ-BR23								
MBROS-S		EORTC QLQ-BR23						
		Body image		sexual activity		sexual pleasure		future perspectives
	Odds Ratio	IC	Odds Ratio	IC	Odds Ratio	IC	Odds Ratio	IC
qs1	1.009	(0.999 - 1.02)	1.001	(0.99 - 1.014)	1.006	(0.99 - 1.02)	1	(0.99 - 1.01)
qs2	1.011	<b>(1.001 - 1.02)</b>	1.002	(0.99 - 1.01)	1.012	<b>(1 - 1.03)</b>	1.004	<b>(1 - 1.01)</b>
qs3	1.02	<b>(1.007 - 1.03)</b>	1	(0.99 - 1.01)	1	(0.98 - 1.02)	1.006	<b>(1 - 1.02)</b>
qs4	1.01	<b>(1.002 - 1.02)</b>	1.007	(0.995 - 1.020)	1.007	(0.99 - 1.02)	1.003	(0.99 - 1.01)
qs5	1.01	<b>(1.002 - 1.022)</b>	0.9955	(0.98 - 1.007)	1	(0.99 - 1.015)	1.006	<b>(1 - 1.015)</b>
qs6	1.01	<b>(1.00 - 1.02)</b>	1.01	<b>(1 - 1.026)</b>	1	(0.98 - 1.01)	1.001	<b>(1 - 1.01)</b>
qs7	1.016	<b>(1.006 - 1.027)</b>	1.004	(0.99 - 1.017)	1	(0.98 - 1.01)	1.01	<b>(1.001 - 1.021)</b>