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BRIEF REPORT

Does nipple preservation in mastectomy improve satisfaction with cosmetic results, psychological adjustment, body image and sexuality?

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Abstract We investigated the influence of nipple areolar complex (NAC) sparing in mastectomy, on patient satisfaction with cosmetic results, body-image, sexuality and psychological well-being. We developed a specific questionnaire and compared two groups of women who underwent radical mastectomy with immediate breast reconstruction (IBR). Between 2004 and 2006, 310 women with NAC preservation and 143 patients with successive NAC reconstruction were mailed the questionnaire at follow-up 1 year after definitive complete breast reconstruction surgery. 256 questionnaires was available. Our results showed significant differences in favour of the NAC sparing group regarding body image (difficulty in looking at themselves naked and being seen naked by their partners after surgery, $P = 0.001$ and $P = 0.003$, respectively); regarding satisfaction with the appearance of the nipple ($P < .0001$) and with the sensitivity of the nipple ($P = 0.001$); regarding the feeling of mutilation ($P = 0.003$). NAC sparing in mastectomy has a positive impact on patient satisfaction, body image and psychological adjustment.

Keywords Satisfaction with cosmetic plastic surgery results · Mastectomy · Nipple areolar complex sparing · Psychological adjustment · Body image · Sexuality

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Introduction

Nowadays breast cancer surgery has become less and less mutilating and it is now accepted that early-breast cancer patients treated either by mastectomy or by breast-conserving procedures have comparable survival rates [1, 2]. However, a mastectomy is required in case of multifocal, large tumors; extensive local recurrences after conservative treatment; or patient's fear when proposing conservative treatment. The negative psychological impact of breast loss has been frequently studied [3–9]; it is now well recognized that cancer treatment can have a negative impact on emotional well being, body image perception, sexuality and breast conservative surgery helps women to cope better with cancer [10, 11]. In our clinical experience in contact with patients, as surgeons and as psychologists, we observed that the removal of the NAC when a mastectomy needs to be performed may contribute to increase the sense of mutilation and emotional suffering.

To reduce this negative psychological impact, since 2002 at our institute, women undergoing mastectomy, for cancers located outside the central area of the breast, have been proposed a new type of nipple sparing mastectomy (NSM) associated with intraoperative electron-beam radiotherapy (ELIOT) delivered to the region of the areola. Results were published by Petit et al. [12–14]. The effect of removal of the NAC during mastectomy and of nipple reconstruction

procedures has not been often studied; Wellisch et al. [15] demonstrated the positive psychological impact of NAC reconstruction after mastectomy and breast reconstruction when comparing patients with or without NAC reconstruction. We decided to further investigate the possible advantages of NAC preservation in mastectomy. In our experience, there is also a growing interest regarding patient's satisfaction with the results of plastic surgery, since it is known to influence the coping process and psychological adjustment [6]. For this reason, we decided to develop a new specific questionnaire in order to understand whether NAC preservation could improve patients' satisfaction with the results of breast reconstructive and plastic surgery and psychological well-being.

Aims of the study

The purpose of the present study is to investigate the influence of nipple sparing in mastectomy on patient's satisfaction with cosmetic results, body image, sexuality and psychological adjustment comparing two groups of women who underwent radical mastectomy with IBR and either NAC sparing or NAC reconstruction. Our objectives are (1) to understand whether women who are submitted to the loss of their breast while keeping their NAC are more satisfied with cosmetic results than are women who do not conserve the NAC, (2) to understand whether women who are submitted to the loss of their breast while keeping their NAC are more satisfied with body image perception and sexuality, (3) to understand if NAC sparing has a positive impact on adjustment helping women to cope better with the psychological consequences of mastectomy and if NAC sparing increases fear of recurrence.

Materials and methods

Study design

Phase I

Between 2002 and 2004, we developed and tested a specific self-administered questionnaire to assess patient's satisfaction with cosmetic results following breast plastic reconstruction; to investigate the influence of NAC sparing on body image, sexuality and psychological adjustment. We also performed interviews with target patients selected for our psychological study.

Phase II

From 2004, we enrolled women who underwent radical mastectomy, with immediate breast plastic reconstruction with or without NAC preservation. The criteria we chose in order to select patients for the study were the following: primary invasive breast cancer (T1, T2, T3) and primary ductal carcinoma in situ; age over 18; no previous chemotherapy; no bilateral surgery for breast cancer. We chose these inclusion criteria in order to have a homogeneous group of women and to exclude factors that may add confounding variables, which could modify perception of body image. We compared two groups of patients: women who preserved their nipple during mastectomy and women who did not preserve their nipple and underwent successive NAC reconstruction, considered as the control group. The self-administered questionnaire was sent by mail. In the NSM group, for those women who had an IBR, questionnaires were sent by mail 1 year after breast surgery, except for those who had an expander to whom questionnaires were sent 1 year after the definitive prosthesis was placed. In the control group questionnaires were sent by mail about 1 year after NAC reconstruction was performed.

Four hundred and fifty-three women ($N = 453$) who were proposed NAC sparing or removal during mastectomy were enrolled in our study. Eligible patients agreeing to participate in the psychological study were enrolled after giving written informed consent. A small sample of non-responders was interviewed by telephone after 18–24 months from surgery. Two psychologists independently reviewed the interviews and listed eight categories of reasons for missingness. Reasons for missingness were further classified as: not related to surgery or questionnaire (missing completely at random, MCAR), not surgery related (missing at random, MAR) and surgery related (missing not at random, MNAR).

Brief description of the new surgery technique

Since 2002 in the Departments of Breast Surgery and of Plastic Surgery of our institute, when a mastectomy was the treatment chosen for breast cancer treatment, the patient was informed of the possibility to preserve her nipple when the tumor corresponded to inclusion criteria of the surgical study. The new type of mastectomy (NSM) (using a subcutaneous mastectomy technique) was associated with intraoperative electron-beam radiotherapy (ELIOT) delivered to the region of the areola. The NSM is performed leaving 5 mm of glandular tissue behind the nipple areola complex to preserve its blood supply. The reconstruction is immediately performed by prosthesis or by expander then replaced with a definitive prosthesis. At the moment of surgery the inclusion criteria for NAC sparing were: small tumors located at least 1 cm outside the areola margins; absence of nipple retraction or bloody discharge; absence of retroareolar microcalcifications. Multifocality was not a cause of exclusion, provided that all the tumor sites were

distant from the areola. Patients were excluded at the time of the operation if the frozen examination of the retro-areolar tissue was positive for carcinoma: in these cases ELIOT was not delivered. Patients who could not have NAC sparing and completed surgery with NAC reconstruction were included in the control group. The new surgery technique was explained and discussed with the patient: advantages, disadvantages and possible complications were illustrated. All patients signed a written surgical informed consent before surgery.

Methods

Instruments

Item generation and scale construction

Between April 2002 and August 2004 we developed our specific questionnaire. A MEDLINE search from 1980 to 2002 was made for relevant quality of life issues concerning patient satisfaction with cosmetic results after breast reconstruction surgery, psychological adjustment after mastectomy, body image perception, perception of NAC sparing or NAC reconstruction after mastectomy, sexuality and fear of recurrence after breast cancer. A working group of psycho-oncologists, breast surgeons, plastic surgeons, data-managers and statisticians was formed. The first phase (*step I* generation of relevant items) was aimed at compiling a list of relevant issues that covered the domains of interest, mainly perception of NAC sparing, satisfaction on cosmetic results, body image and sexuality, and the group decided to include a list of items. The initial draft version was given to 10 target patients, 10 health care professionals and 10 non health care professionals. They were asked to state whether the issues were clear, important or not and if any aspects of interest had been overlooked. The second phase (*Step II*) consisted in translating the issues into a set of questions; the working group modified the items after analysis and deleted issues that were considered less important. Some items were added. Then (*Step III*) we performed a pre-testing of the provisional questionnaire: this version had 23 items.

Preliminary field testing

Finally, a preliminary field testing (*Step IV*) of the questionnaire with target patients was performed. We chose to administer the questionnaire (23 items) to three groups of women who underwent three different types of surgery (42 radical mastectomies with nipple preservation, 37 radical mastectomies with nipple suppression and 50 lumpectomies), in order to explore if the items and the rating scale chosen were able to detect differences in opinions or perception among patients undergoing with three different surgical techniques. At this stage, we were also interested in collecting information on (a) ease of understanding and acceptability of items; (b) redundancy of items; (c) missing items; (d) overall ease of completion. Patients completed questionnaires while at our institute for routine scheduled visits or at home (each questionnaire was sent by mail with a pre-paid envelop for restitution) and were encouraged to make additional comments. Thanks to this preliminary field testing, the questionnaire was modified in order to meet our objectives; we deleted, rephrased and added items as necessary. Because the first version of our questionnaire was too general, in order to better understand the impact of surgery and NAC sparing on body image and sexuality and to increase the level of specificity we added different items. Thanks to P. Hopwood study [16], still not validated in Italian, to our preliminary results and to the patients' interviews we included some specific items that assess the satisfaction with body image before and after the disease.

Because a woman's overall psychological health, relationship satisfaction and premorbid sexual life appear to be strong predictors of postcancer sexual satisfaction [9], we included items to assess the satisfaction with sex before and after the disease. We added one item to evaluate the possible influence of factors not related to surgery on sexuality. We also asked the patient's partner to express their opinion and level of satisfaction with cosmetic plastic results after surgery.

In total, the last version of the questionnaire consisted of 56 items (see Appendix 1 for the whole questionnaire). The questionnaire is composed of four categories: (1) satisfaction with plastic-surgery cosmetic results (26 items), (2) body image (before and after the disease, 13 items), (3) sexuality (before and after the disease, 16 items), (4) fear of recurrence (1 item). We chose a 5-likert scale ranging from "not at all" to "very much". One of the most important items regards the feeling of mutilation (see item 15bis) in the category (2) related to body image.

Ten semi-structured in-depth interviews were performed by psychologists in order to evaluate the comprehensibility and the content of the items in the revised version. All women expressed deep suffering not only for the loss of their breast but also for the loss of their NAC. One patient stated that the nipple areola was perceived as the signature of breast identity, it was, in her words, "*the eyes of the breast*". When we asked women who underwent the new technique (preservation of the NAC) to explain why they agreed to participate in the study, most answered that one of the reasons was "to decrease their sense of mutilation". When interviewed, all women who did not conserve their

nipple expressed their disappointment for not having preserved their nipples.

Field testing

The final version of the questionnaire was administered to patients enrolled in the psychological study conducted along the surgical study, from September 2004 to September 2006. At the beginning of the study, part of the sample was used to assess compilation time ($N = 197$ patients): 72 patients (36.5%) needed <10 min to complete the questionnaire, 67 patients (34.0%) needed 10–15 min and only 6 patients (3.0%) needed >30 min. Overall the average time of compilation was 13.4 min. Ninety-two point four percent patients did not receive any help during the compilation. One hundred seventy-five patients (88.4%) considered the questionnaire comprehensible, 92.4% ($n = 183$) did not find the items embarrassing, 93.4% of patients ($n = 185$) considered the items pertinent. The second version of the questionnaire under field testing, at the time of the preliminary analysis, was well accepted by patients (response rate = 63% in the NSM group, response rate = 72% in the group with nipple reconstruction) and we received very good feedback from patients on appropriateness of content and comprehensibility. Analysis of missing data on the responses' frequency didn't reveal any problematic items.

Statistical methods

Descriptive statistics and frequencies are given for socio-demographic features and relevant clinical variables, at surgery time, by treatment group (NAC vs. Controls). Comparisons between treatment groups are tested through Mantel–Haenszel tests or Fisher's Exact test. We present histograms by treatment groups for statistically significant items of the questionnaire.

One of the most important questions being the one regarding feeling of mutilation, we analyzed frequency distribution of missing answers to feeling of mutilation question (see item 15bis) by treatment group and reasons of missingness. Cohen's Kappa was used to assess the agreement between the two psychologists, who evaluated the reasons for missingness. We assessed the association between missing values for item 15bis and treatment group, with a logistics regression model to take into account clinically or psychologically relevant variables. Odds Ratios (OR) with their 95% Confidence Intervals (CI) are evaluated for treatment group and clinically or psychologically relevant variables. Frequency distributions for the reasons arising from phone interviews, classified as MCAR, MAR and MNAR are evaluated. Two-sided P values below the conventional 5% threshold were considered statistically significant.

Results

Description of the sample

From September 2004 to September 2006, 310 women with NAC preservation (NSM group), and 143 patients with successive NAC reconstruction (control group) were mailed the questionnaire. At the time of analysis, 51.2% of women with mastectomy, IBR and NAC sparing and 67.8% of women with mastectomy, IBR and successive NAC reconstruction, answered the questionnaires. Thus a total of 256 questionnaires were available from patients who had completed 1 year of follow-up after definitive complete breast reconstruction surgery.

Socio-demographic and relevant clinical variables by treatment group (control group vs. NSM group) at surgery time are summarized in Table 1. Mean age at surgery for

Table 1 Summary statistics for relevant socio-demographic and clinical features at surgery time by treatment group

Group	Nipple ($N = 159$)	Control ($N = 97$)	Total ($N = 256$)
Mean age years (min–max)	46 (26–73)	47 (24–80)	46 (24–80)
Education			
<High school	27 (17.0%)	32 (33.0%)	59 (23.6%)
≥High school	130 (81.8%)	61 (62.9%)	191 (76.4%)
Missing	2 (1.2%)	4 (4.1%)	6 (2.3%)
Marital status			
Married/living together	125 (78.6%)	66 (68.0%)	191 (74.6%)
Divorced/single	21 (13.2%)	31 (31.9%)	52 (20.3%)
Missing	13 (8.2%)	0	13 (5.1%)
Histology			
Invasive Ca	125 (78.6%)	80 (82.5%)	205 (80.1%)
In situ Ca	33 (20.8%)	13 (13.4%)	46 (17.9%)
Missing	1 (0.6%)	4 (4.1%)	5 (1.9%)

NSM group and control group were 46 years (range = 26–73) and 47 (range = 24–80), respectively (Table 1). The comparison between non-responders and responders showed no significant differences between the two groups regarding age, geographic origin ($P = 0.74$), marital status ($P = 0.69$). The comparison regarding education showed statistically significant differences (Chi square P value 0.002): education was higher in the NSM group.

Impact of NAC preservation (NSM) on body image perception

In our questionnaire, results showed an important decrease of satisfaction with overall body image, after the disease and surgery, in both groups (Fig. 1a). The women who expressed an increased dissatisfaction (answer "quite a bit" or more) were 10% in the NSM group and 9% in the control group. When interviewed regarding the item "did you feel feminine?" women felt less feminine after surgery (Fig. 1b), especially in the control group: 16% of the patients in the NMS group and 26% in the control group expressed "quite a bit" or more decrease in femininity after surgery. Regarding nakedness, women had more difficulty in looking at themselves naked after surgery (Fig. 1c), especially in the control group; 15% of women in the NSM group had an increased difficulty ("quite a bit" or more) in looking at themselves naked and 34% in the control group. We also observed an increased difficulty in being seen naked by their partners (Fig. 1d), especially in the control group; 19% of women expressed a "quite a bit" or more increased difficulty in the NSM group and 39% in the control group answered "quite a bit" ore more. Analysing in details the differences between the two groups after surgery (Figs. 2, 3), we observed that they were significantly different in answering the questions regarding difficulty in looking at themselves naked and being seen naked by their partners ($P = 0.001$ and $P = 0.003$, respectively). The score distribution that assessed the feeling of mutilation (Fig. 4, item 15bis) also showed a significant difference between the two groups ($P = 0.003$).

Impact of NAC preservation (NSM) on feeling of mutilation: the contribution of the analysis of missing values to understand better this issue

The analysis of distribution frequency of missing answers to the question on feelings of mutilation (item 15bis) showed a significantly higher proportion of missingness in the control group compared to the NSM group (17/97 vs. 2/159, in the control and NSM groups, respectively; $P < 0.001$). Furthermore, evaluating all demographic-dependent variables and clinical data (histology, complications, treatments) to verify if they were associated to missing answers to question 15bis, we observed a significant relationship only with the surgical procedure (OR = 0.313, 95% CI: 0.117–0.837). All Odds Ratios

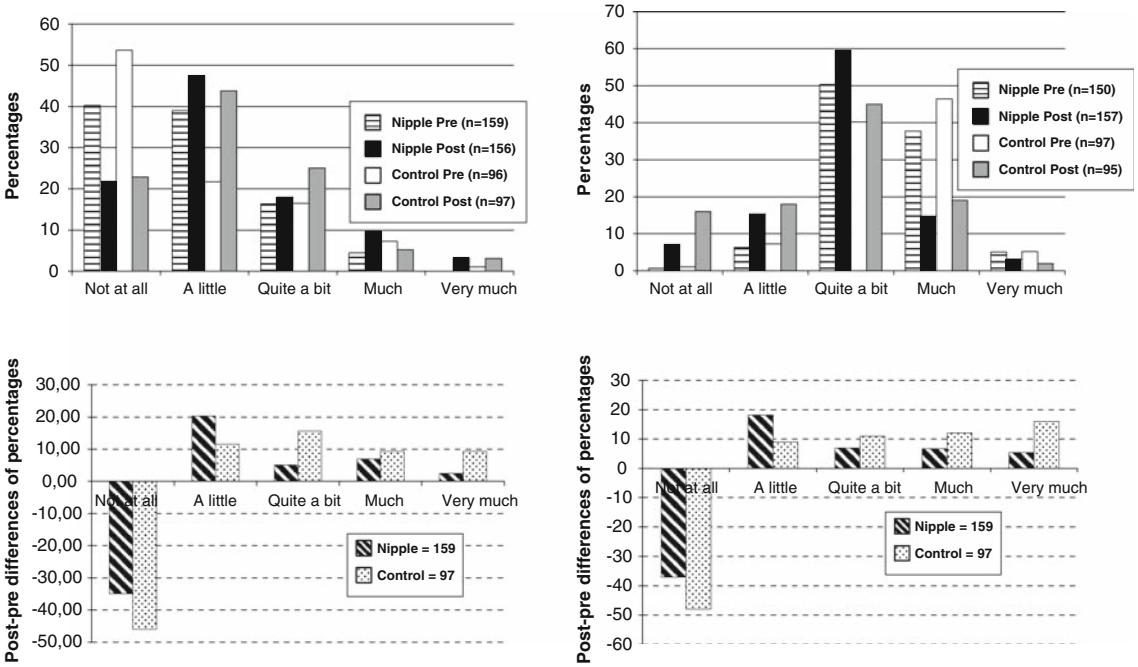

Fig. 1 **a** Dissatisfaction with the body **b** Did you feel feminine? **c** Did you find it difficult to look at yourself naked? **d** Did you find difficult being seen naked by your partner?

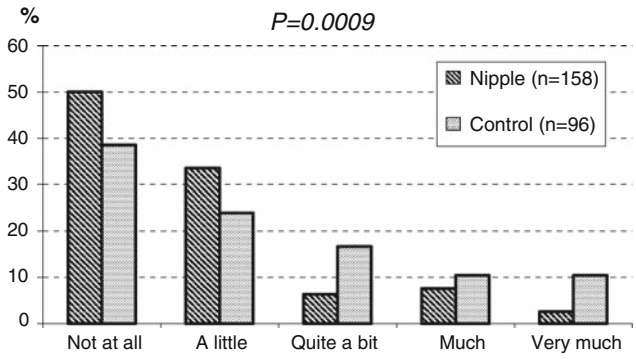

Fig. 2 Did you find it difficult to look at yourself naked?

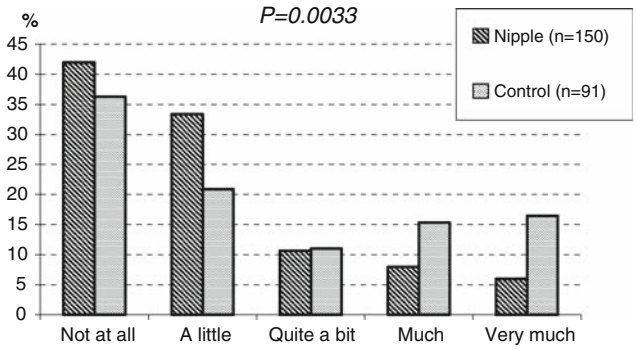

Fig. 3 Do you find it difficult being see naked by your partner?

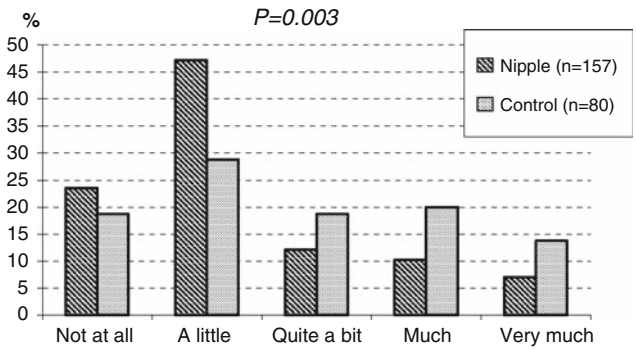

Fig. 4 Did you experience feelings of mutilation? (Item 15bis)

(OR) with their 95% Confidence Intervals (CI) are presented in Table 2.

Impact of NAC preservation (NSM) on sexuality

Ninety-one percent of women in the NSM group felt sexually attractive before the disease versus 54.5% after cancer and treatments, 98% of women in the control group felt sexually attractive before cancer versus 72% after cancer (Fig. 5). There were no significant differences between the two groups regarding sexual life and impact of nipple sparing on sexuality.

Table 2 Frequency distribution of missing answers to feeling of mutilation question (item 15bis)

Parameter	OR (95% CI)
Group (Nipple vs. control)	0.31 (0.12–0.84)
Axillary dissection	1.01 (0.75–1.34)
Prosthesis complications	1.12 (0.39–3.21)
Nipple complications	0.66 (0.23–1.93)
Chemotherapy	0.67 (0.24–1.89)
Radiotherapy	0.69 (0.08–5.87)
Hormone therapy	0.46 (0.17–1.25)
Education	0.45 (0.17–1.20)
Marital status	0.31 (0.07–1.49)
Histology (invasive vs. in situ)	0.96 (0.84–1.11)
Bilateral cosmetic surgery	1.37 (0.57–3.25)

Impact of NAC preservation on satisfaction with cosmetic results

A significant difference was observed regarding the level of satisfaction with the appearance of the nipple in the two groups ($P = <.0001$) (Fig. 6) as well as regarding the level of satisfaction with the sensitivity of the nipple ($P = 0.001$) (Fig. 7). Satisfaction was higher in the NSM group.

Impact of NAC preservation on the psychological adjustment

Ninety-three percent (143/154) of patients in the NSM group reported that the preservation of their nipple helped them to cope with the disease and its consequences (Item 31). Ninety-two percent (142/155) of them reported that the preservation of their nipple helped them to feel less mutilated (Item 32). Eighty-nine percent (79/89) of the women

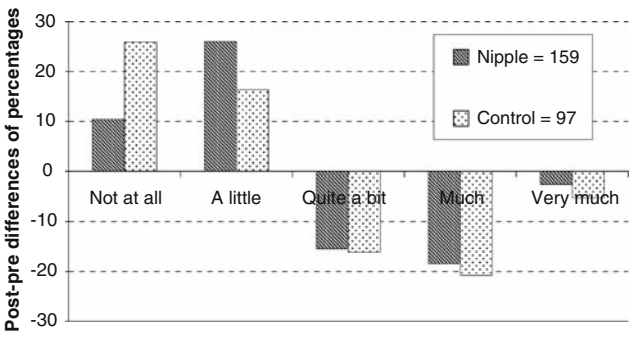

Fig. 5 Did you feel sexually attractive?

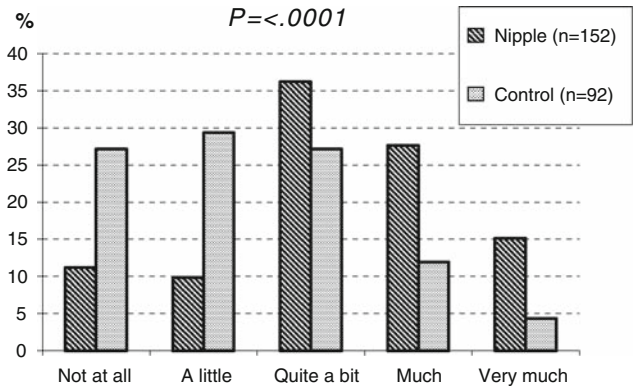

Fig. 6 Have you felt satisfied with the appearance of your nipple?

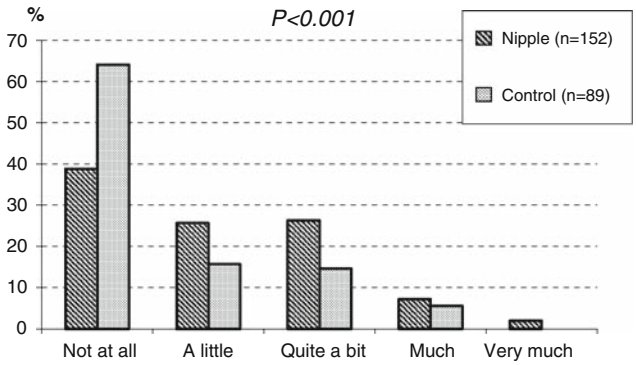

Fig. 7 Have you felt satisfied with your nipple sensitivity?

who did not preserve their nipple (control group) would have preferred to have done so (Item 33, percentages correspond to the score of "quite a bit" or more). Regarding anxiety for the future and fear of recurrence, globally NSM does not seem to increase the level of anxiety. Women in both groups expressed globally a low level of fear of recurrence (respectively 31% in the NSM expressed a high level of fear, vs. 28% in the control group).

Interviews of non-responders

Considering the large number of nipple non-responders (48.2%), it was decided to investigate the reason for this lack of responses to the questionnaire. We telephoned a random sample of non-responders ($N = 34$ in the NSM group and $N = 6$ in the control group). The interviews were aimed at evaluating how much surgery-dependent dissatisfaction affects the lack of questionnaire returns. The reasons arising from our phone interviews were grouped into eight categories and further classified as MCAR (Missing Completely at Random), MAR (Random, that is only related to the questionnaire or psychological reasons, but not to the surgical procedure) and MNAR (Non-random or related to surgery). Frequency distribution of MCAR, MAR and MNAR are presented in Table 3. Only 12.5% of patients reported that they did not return their questionnaires for surgery-related reasons. Agreement was evaluated through Cohen's Kappa. Following the interpretation suggested by Landis and Koch [17] the agreement between two psychologists who conducted a blind evaluation of the reasons for not returning the questionnaires was almost perfect (Kappa = 0.92, 95% CI : 0.70–1.00).

Table 3 Frequency distribution of MCAR, MAR and MNAR

Missing type	Reasons for not-returning	*N* (%)
MCAR	Lack of time or oversight	18 (45%)
	Not received	
MAR	Embarrassing questions in the questionnaire	17 (42.5%)
	Depressed	
	Inadequacy of the questionnaire, disappointment due to questionnaire	
	Non adjustment or refusal or denial of surgery or disease	
MNAR	Anger about surgery or complications	5 (12.5%)
	Disappointment due to complications after surgery	

Discussion

It is now recognized that women after mastectomy are more likely to develop psychological adjustment disorders and there are recognized benefits of breast conservation and breast reconstruction over mastectomy [10, 11, 18, 19]. Previous studies have investigated the influence of cosmetic outcome on psychosocial morbidity in primary breast cancer [6, 20]. These studies reported a good correlation between satisfaction with cosmetic outcomes and positive body image perception, sexuality and self-esteem and showed that the more conservative was breast surgery the better were quality of life and psychological adjustment. There are very few studies assessing the impact of NAC reconstruction on breast reconstruction: e.g., we found only one specific article [15] that showed that NAC reconstruction had a positive impact on patient's satisfaction with cosmetic results.

In our study, we wanted to understand the psychological contribution of nipple conservation versus nipple reconstruction comparing NSM versus mastectomy with breast and NAC reconstruction. Investigating patient's treatment preferences, we clearly found that most of women who did not preserve their nipple would have preferred keeping it

and the majority of women who preserved their nipple expressed a very high level of satisfaction for having done so.

Analyzing our results in details, we can see that the new technique of NSM has impacted very positively especially on patient satisfaction with cosmetic results and body image related to nakedness. Results showed that the type of surgery in favour of NSM positively influences patient perception e.g., when the patient looks at herself naked or is seen naked by her partner. Women who have had nipple conservation (NSM) experienced less difficulty than women who did not keep their nipple. Our study also showed that patients who preserved their nipple felt less mutilated regarding their breast with a significant difference between the two groups.

Our results showed an important decrease of overall satisfaction with body image, after the disease and surgery, in both groups. This result could probably be attributed to the impact of the type of surgery on the level of expectations of the patients: women in the NSM group more likely had a higher level of expectations and more likely felt disappointed about overall satisfaction with their body. We also found a higher education level in the NSM group and we can hypothesize that a higher education may have influenced negatively the level of satisfaction because patients could be more demanding and could also have more expectations.

The analysis of frequency distribution of missing answers to the question of feelings of mutilation (item 15bis), one the main domain of our study, showed a significantly higher proportion of missingness in the control group compared to the NSM group. This difference cannot be ascribed to difficulties related to the item itself, because we obtained very good scores on the analysis of comprehensibility. The higher proportion of missingness in the control group may be explained by the painful emotional resonance generated by this item : we can say that women in the control group faced two losses in their body; the loss of the breast and the loss of their nipple and probably they felt more distressed regarding mutilation than women in the NSM group. We decided to analyse more in-depth the missing data of our study, given the importance of this issue. Results obtained interviewing non responders over the phone indicated that our results were not biased because of non-responders. Eighty-eight percent of the patients sampled for this interview did not reply for reasons not related to surgery but for emotional reasons. Filling in the questionnaire put pressure on the patient's psychological denial defences that may be an adaptative coping mechanism. Women may refuse to fill in a questionnaire or a specific item to avoid painful emotions.

In many studies, it appeared that breast conservation protected women's perception of their bodies but did not contribute to a more positive sexual adjustment over time [21]. Regarding the negative psychological impact of mastectomy, we wanted to understand if NAC preservation in mastectomy may have a positive impact on sexuality after breast surgery. Overall, a high number of women in both groups expressed many difficulties in their sexuality after the diagnosis and surgery. There is an important decrease of satisfaction in sexual life. It is understandable that sexuality after cancer diagnosis and treatments may present difficulties. Sexual activity, sexual pleasure and well-being need a relaxed frame of mind, dealing with grief, due to a series of losses such as the loss of one's health, the loss of one's breast, with anxiety associated with fear for death and the future does not facilitate a relaxed and pleasant sexual activity.

Rising interest in improved cosmesis has led to the introduction of NSM as an acceptable alternative to traditional mastectomy. From the oncological point of view recent studies [12–14, 22–24] and a recent review of the literature [25] showed that the risks and complications of NSM, with or without ELIOT, were acceptable, when compared to the traditional surgical treatment of breast cancer and NSM can be considered as a viable option in the appropriate setting.

To conclude, our study showed the point of view of women who expressed a very high level of satisfaction for having preserved their nipple and perceived this surgery as helpful to better deal with the traumatic experience of breast cancer and breast loss. Our results clearly showed that most women who could not preserve their nipple would have preferred keeping it. Patients who preserved their nipple felt less mutilated regarding their breast. The new technique of NSM has impacted positively on patient satisfaction with cosmetic results, with femininity and body image especially related to nakedness.

Acknowledgment This study has been supported by AVON Italy.

Appendix 1

Assessment of the patients' satisfaction with cosmetic results, physical and emotional impact of mastectomy

In this questionnaire you will be asked how you feel about the physical and emotional impact of mastectomy with or without nipple sparing.

We would like to know from you how you felt about your physical aspect *BEFORE your diagnosis*:

1. Did you feel unsatisfied with your body?
2. Did you feel physically attractive?
3. Did you feel feminine?
4. Did you find it difficult to look at yourself naked?
5. Did you find it difficult being seen naked by your partner?

6. Were you satisfied with the size of your breast?
7. Were you satisfied with the shape of your breast?
8. Were you satisfied with the appearance of your nipple?

During *the last four weeks*:

9. Have you felt unsatisfied with your body?
10. Have you felt physically attractive?
11. Have you felt less physically attractive because of the disease or its treatment?
12. Have you been feeling feminine?
13. Have you been feeling less feminine because of the disease or its treatment?
14. Did you find it difficult to look at yourself naked?
15. Did you find it difficult being seen naked by your partner?

15bis. Did you experience feelings of mutilation?

Regarding the breast operated and reconstructed:

16. Have you been satisfied with the size of your breast?
17. Have you been satisfied with the shape of your breast?
18. Have you been satisfied with your breast skin sensitivity?
19. Have you been satisfied with the appearance of your scar?
20. Has the other breast been remodeled? ❑ YES ❑ NO

If *YES*, we would like to know:

21. Have you been satisfied with the size?
22. Have you been satisfied with the shape?
23. Have you been satisfied with your breast skin sensitivity?
24. Have you been satisfied with the appearance of your scar?

Now we would like to know from you, regarding cosmetic results of plastic surgery:

25. Do you consider the overall result of the surgery is similar to the natural aspect of your breast?
26. Have you been satisfied with cosmetic result of the plastic surgery overall?
27. Did your surgery results meet with your expectations?
28. Did you regret having had the breast reconstruction?
29. Did you have nipple sparing surgery? ❑ YES ❑ NO

Please, answer only if YES:

30. Have you been satisfied having preserved your nipple?
31. Did the preservation of your nipple help you to cope with the disease and surgical consequences?
32. Did the preservation of your nipple help you to feel less mutilated (disabled)?

Please answer only if it has NOT been possible to preserve your nipple:

33. Would you have preferred to keep your nipple?

Please indicate, why: .....
During *the last four weeks*:

34. Have you felt satisfied with the appearance of your nipple?
35. Have you felt satisfied with your nipple sensitivity?

Now we would ask you some questions about an aspect of life which could be important for a woman, regarding sexuality.

We would like to know, *BEFORE the disease*:

36. Was sexuality an important part of your life?
37. Did you feel sexually attractive?
38. Was your breast important to your sexual life?
39. Was your nipple important to your sexual life?

During *the last 4 weeks*:

40. Was sexuality an important part of your life?
41. Did you feel interested in sexual activities?
42. Did you feel sexually attractive?
43. Have you been feeling less sexually attractive because of the disease or its treatment?
44. Were you sexually active?

Please, answer only of you have been sexually active *during the last four weeks*.

45. Did you feel enjoyment during sexual activities?
46. Did your breast play an important part in your sexuality?
47. Did your nipple play an important part in your sexuality?
48. Have you noticed a change regarding your partner in your sexual intimacy?
49. Have you noticed a diminished frequency of breast caressing in your partner?
50. Have you noticed that you have a reduced sexual drive?

Now we would like to know from you if *during the last 12 months*:

51. If there has been personal situation, a part from your disease and breast surgery, that would have interfered with your sexuality? ❑ YES ❑ NO
    Only if you want, please indicate:

    ○ Family problems
    ○ Grief
    ○ Partner problems

- ○ Separation
- ○ Work problems
- ○ Job loss
- ○ Having to renounce to maternity because of the disease or your treatments
- ○ Economic problems
- ○ Impact of hormonal therapy (if you take an hormonal therapy)

Other……

We would like to know during *the last four weeks*:

52. Have you been frightened by the possibility of disease recurrence

Now we would like you to answer these three last questions:

53. How would you grade on a scale from 0 to 10 your satisfaction with cosmetic results of the your surgery overall:

Not at all satisfied Completely satisfied

0 1 2 3 4 5 6 7 8 9 10

54. If you are married or have a partner, has your partner expressed an opinion about the cosmetic result of your surgery overall: ❑ YES ❑ NO

55. If YES, could you please indicate your partner's opinion regarding the cosmetic result of your surgery?

Not at all satisfied Completely satisfied

0 1 2 3 4 5 6 7 8 9 10

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