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Patient-Reported Satisfaction after Prophylactic Operations of the Breast

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Keywords

Prophylactic mastectomy · Satisfaction · *BRCA1/BRCA2* mutations · Long-term follow-up · Breast cancer

Abstract

Background: Prophylactic mastectomies in carriers of mutations in *BRCA1* or *BRCA2* are becoming increasingly more accepted. We investigated the outcome after prophylactic mastectomy, especially regarding satisfaction with the procedure, in a monocenter study. **Methods:** *BRCA1/2* mutation carriers and non-carriers with elevated pedigree-based cancer risk were followed prospectively in a structured surveillance program between 2000 and 2017. A retrospective telephone survey was conducted among all patients with documented prophylactic mastectomy. Complications and satisfaction with the decision for prophylactic mastectomy were recorded. **Results:** 39 patients who opted for a prophylactic mastectomy (38 *BRCA1/2* mutation carriers and 1 non-carrier) were interviewed. Mostly nipple-sparing mastectomy with reconstruction was performed (87%). Half of the patients (22/39; 56.4%) had a history of unilateral breast cancer. The median time since prophylactic mastectomy was 5.6 years. While 61.5% did not report any complications, flap loss was seen in 15% (3/20) and moderate limitations in everyday life were present in 20% (7/35). An improvement in quality of life was noticed by 82% after prophylactic mastectomy and no patient expressed regret with regard to the decision. **Conclusions:** Prophylactic mastectomy is a procedure with

risk for long-term complications in some cases. Our results confirm high satisfaction with the decision and improved quality of life.

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Introduction

BRCA1/2 mutation carriers face a high lifelong risk for breast and ovarian cancer. For both genes, the breast cancer risk until the age of 80 years is 70%, and for ovarian cancer it is 40% and 17% for *BRCA1* and *BRCA2*, respectively [1]. Intensified screening programs with breast magnetic resonance imaging (MRI) aim to improve the prognosis of breast cancers through early detection, and there is evidence for a survival benefit by surveillance [2]. But mutation carriers increasingly opt for risk-reducing operations of the breast. For healthy carriers, not only a reduction of 90–95% in the risk of subsequent breast cancer was shown by bilateral prophylactic mastectomy, but also improved overall survival was described [3]. In patients with unilateral breast cancer, the benefit of contralateral prophylactic mastectomy is less clear [4, 5]. Prior to the risk-reducing surgery, comprehensive counseling at different time points is necessary. Counseling should take place in specialized centers and should contain different reconstruction methods, such as the use of implants and autologous tissue. The decision is guided by a woman's activity and plans, body shape, and personal preferences.

Table 1. Questionnaire for the telephone interview

Questions	Spectrum of answers				
	MRM	SM			
Type of mastectomy	MRM	SM			
Type of reconstruction	none	implant	autologous tissue		
Number of operations	total				
Complications after surgery	none	moderate	severe		
Satisfaction with cosmetic result	not at all	rather unsatisfied	indifferent	satisfied	very satisfied
Pain	none	little	moderate	strong	severe
Improvement of quality of life	none	little	moderate	severe	
Limitations in everyday life	none	little	moderate	severe	
Limitations in leisure time and activities	none	little	moderate	severe	
Same decision for prophylactic surgery again?	yes	no	different		
Negative impact on family/partnership?	yes	no	indifferent		
Salpingo-oophorectomy	yes	no			

MRM, modified radical mastectomy; SM, subcutaneous mastectomy.

Satisfaction of patients depends on the esthetic outcome, freedom from lasting symptoms with limitations in daily life, and reduction of anxiety after surgery. According to 1 meta-analysis, most patients would decide to have the same procedure performed again [5]. But after unilateral sporadic breast cancer, reduced satisfaction of patients with contralateral prophylactic mastectomy with one or more unplanned following surgeries was described [6]. In addition, more body image problems and less sexual pleasure, but less anxiety and improved social activities were reported in a study of women with familial risk for breast cancer at 1 year after prophylactic bilateral breast cancer [7].

With this study, we aimed to investigate the complication rate and satisfaction of carriers at the Dresden center of the German Consortium Hereditary Breast and Ovarian Cancer (GC-HBOC) after prophylactic operations of the breast with and without prior breast cancer diagnosis.

Methods

Between 2000 and 08/2017, all patients who fulfilled certain criteria of familial cancer risk were counseled interdisciplinarily, and molecular genetic analysis was carried out as described previously at the Dresden center of the GC-HBOC [8]. Prophylactic risk-reducing operations were offered to all women with a pathologic mutation in *BRCA1* or *BRCA2*. After consenting to participate in the study, each family was documented in the mutual database of the GC-HBOC. Follow-up was performed for all women who took part in our center's intensified surveillance program or by personal contact with carriers and individuals with very high pedigree-based risk who sought additional counseling for prophylactic operations. All women after risk-reducing bilateral mastectomy are offered to undergo one last MRI to rule out remaining breast tissue in order to objectify the surgical outcome under research conditions 1 year after the procedure.

Between 04/2017 and 08/2017, a telephone survey was conducted among all patients with a documented history of prophylactic

lactic surgery of the breast in our database. Altogether, 44 women were eligible, of whom 39 were interviewed by a breast surgeon and 5 were lost to follow-up. The interview consisted of 18 questions on type of surgery, status of reconstruction, early and late complications, and number of operations (table 1). Moreover, satisfaction, limitations in daily life, and extent of anxiety reduction were enquired about (table 1).

The data cut of the database was 08/2017. Statistical analyses were performed with SPSS.

Results

Altogether, 1,319 families were counseled at the Dresden center, with 330 families carrying a pathogenic mutation in *BRCA1* or *BRCA2*, of which roughly 11% of the women at risk opted for a prophylactic mastectomy. Of the 39 patients with documented prophylactic mastectomy and a telephone interview, 38 were carriers of a pathogenic mutation. 1 patient with prophylactic mastectomy without *BRCA1/2* mutation was from a family with very high pedigree-based risks. The median age at the time of the interview was 47 years. The median time since breast cancer in affected individuals was 7.8 years and the median time since prophylactic mastectomy was 5.6 years. The characteristics of the participants of the telephone interview are displayed in table 2.

In 43.6% (17/39) of the women, an exclusively prophylactic operation was performed (bilateral mastectomy in a healthy individual). About half of the patients (22/39; 56.4%) were affected with unilateral breast cancer (table 3), some of whom had a primary mastectomy, e.g. after neoadjuvant chemotherapy, while others opted for a secondary bilateral mastectomy after initial breast-conserving surgery (table 2). Of the 39 patients under investigation, 25 (64.1%) reported having undertaken a bilateral prophylactic salpingo-oophorectomy (table 2).

Table 2. Characteristics of the participants in the telephone interview

Characteristics	n	Value
Participants, all	39	
Healthy mutation carrier	17	
Healthy without <i>BRCA1/2</i> mutation	1	
Patients with unilateral breast cancer	21	
Age at time of interview, years, median (range)	39	47 (26–75)
Time since breast cancer, years, median (range)	21	7.8 (3–33)
Time since prophylactic mastectomy, years, median (range)	39	5.6 (1–32)
Prophylactic salpingo-oophorectomy, yes/no	39	24/15
Prior chemotherapy, yes/no	21	17/4
Prior radiation therapy, yes/no	21	5/16

Most of the patients with bilateral mastectomy were treated with nipple-sparing subcutaneous mastectomy (34/39; 85%) and alloplastic or autologous reconstruction, while some wished to receive a modified bilateral mastectomy (10%) without reconstruction (fig. 1a). All of the latter were unilaterally affected carriers of mutations in *BRCA1* or *BRCA2*.

Of the 35 patients with reconstruction, 43% (15/35) opted for breast implants, while 57% (20/35) were reconstructed with autologous tissue (fig. 1b). Reconstruction with implants was mostly performed during a single surgery (12/15; 80%). 2 patients needed 2 different surgeries and 1 patient had her implants successfully placed only after 4 surgeries, due to wound healing problems. For autologous reconstruction, a median of 3 surgeries were necessary. Only 4 out of 20 patients (20%) with autologous reconstruction had their surgery completed within a single operation.

Reconstruction was performed without any complications in 61.5% (24/39) of the patients and moderate complication such as infection or rebleeding occurred in 11 patients (11/39; 28.2%). 3 women (7.7%) faced severe complications: 2 with loss of the transplanted tissue flap and 1 with loss of the breast implant (fig. 1d). No life-threatening complications were observed.

Most patients were satisfied or very satisfied with the cosmetic outcome of their prophylactic mastectomy at the time of the interview (33/39; 85%). Only 4 reported discontent (4/39; 10%) with the cosmetic outcome and 2 (2/39; 5.1%) would elect a different type of operation. For example, one of these patients would prefer a subcutaneous rather than a subpectoral location for her implant. Patients with autologous reconstruction displayed higher satisfaction with the result (19/20; 95%) compared to those operated with implant reconstruction (11/15; 73.3%). Moreover, patients after unilateral breast cancer were more often satisfied with the result (16/18; 88.9%) than healthy carriers (14/17; 82.4%).

In terms of long-term surgery-associated morbidity, 59% (23/39) of the patients had no pain. Severe pain was not reported by any of the patients. About half of the pa-

Table 3. Tumor characteristics

	n
Size of tumor	
Tis	1
T1	13
T2	6
T3/T4	0
Unknown	2
Total	22
Nodal status	
N0	13
N1	6
Unknown	2
Total	21
Metastases	
M0	22
M1	0
Unknown	0
Total	22
Tumor biology	
HR+, HER2–	6
HR–, HER2–	12
HR–, HER2+	1
HR+, HER2+	1
Unknown	2
Total	22

HR, hormone receptor; HER2, human epidermal growth factor receptor 2.

tients experienced no limitations in everyday life (20/39; 51.3%) or in the selection of their recreational activities or hobbies (25/39; 64.1%). Severe limitations were not reported by any patient, moderate limitations in everyday life were reported by 7 patients (7/39; 18%), and moderate limitations in leisure time activities by 4 (4/39; 10.3%) (fig. 1e). A moderate restriction in everyday life was, for example, that it was no longer possible to lift or carry

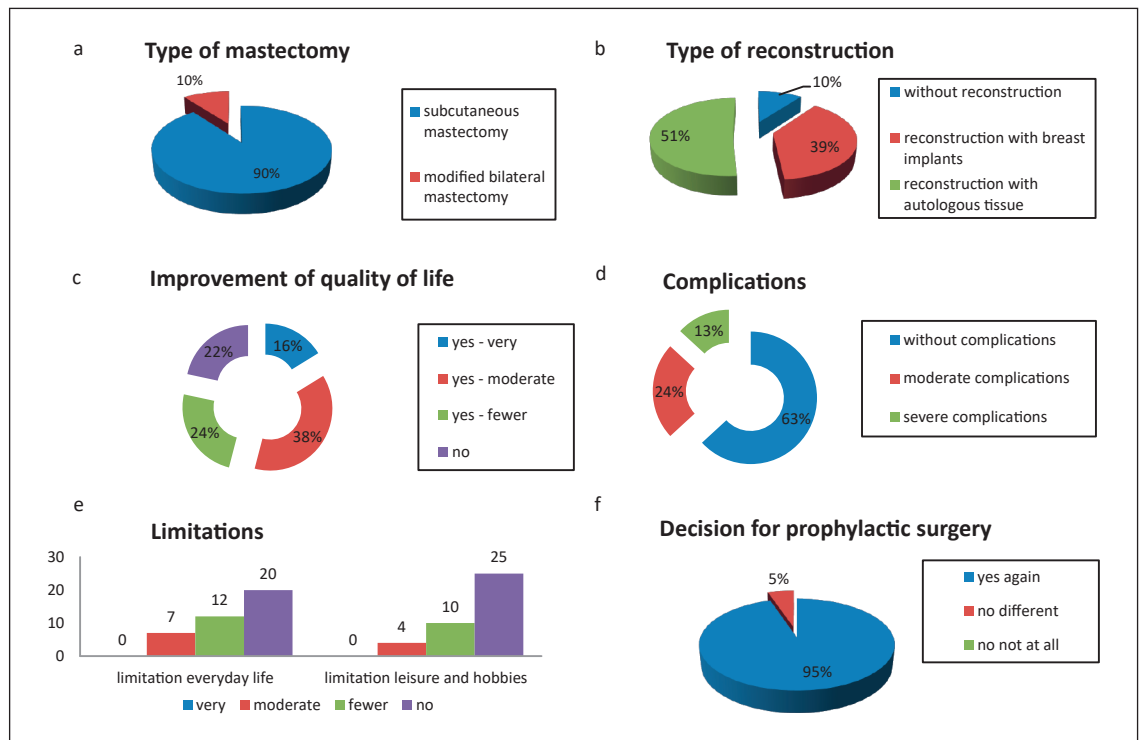


Fig. 1. Results of the telephone interview. **a** Type of mastectomy, **b** type of reconstruction, **c** improvement of quality of life, **d** Complications, **e** Limitation in everyday life/leisure time activities, **f** decision for prophylactic surgery.

heavy weight, and in leisure time activities that a prone position was no longer possible.

Improvement in quality of life was seen in 78% of patients, with reduction of anxiety being the most important reason (fig. 1c). While 95% of the patients would opt for the same procedure again, 5.1% would choose another type of surgery. None of the 39 individuals under investigation reported regrets in terms of their decision for prophylactic mastectomy (fig. 1f). One of the patients had a local recurrence, but none developed metastatic disease.

Discussion

We searched our database for women with documented prophylactic mastectomy after interdisciplinary counseling and molecular genetic analysis of the breast cancer genes in our GC-HBOC center in Dresden. With about 11%, the percentage of carriers who decided to undergo prophylactic mastectomy was low. About half of them had a history of breast cancer, although overall survival benefit has primarily been shown in healthy carriers. In the past, differences in uptake of prophylactic mastectomy were reported among different cultures. Compared to more conservative countries such as France and Poland, uptake in countries such as the USA, Sweden or The

Netherlands was higher [9–12]. With the outing of Angelina Jolie in 2013, the procedure lost its taboo, and we noticed an increase in requests for the surgery at our center. Only recently did another center of the GC-HBOC report a higher rate of prophylactic mastectomy, namely 27% and 44% among affected and healthy *BRCA1/2* mutation carriers, respectively [13]. This difference might be mainly explained by the different approach they adopted in their study. Schott et al. [13] sent questionnaires to all patients who were counseled at the center in Heidelberg, whereas we recorded operations that were actively communicated. However, cultural reasons cannot be completely excluded in comparing centers in the former western part of Germany with those in the former eastern part.

Unplanned additional operations, wound healing problems, and flap loss were described as negative side effects in the meta-analysis of Lostumbo et al. [5]. In a recent one-center study, the overall complication rate was reported to lie at 15.9%, with significantly less complications after autologous reconstruction compared to alloplastic reconstruction [14]. Generally, wound infections and seromas are more common in alloplastic breast implants [14, 15]. Autologous reconstruction was reported to be associated with longer hospital stays, but also with fewer operations, less reconstruction failures

(7.3 vs. 1.3%) and a shorter time to full achievement of reconstruction [16–18]. Complication rates are higher after neoadjuvant chemotherapy or after radiation therapy in smoking or obese patients [19]. After alloplastic breast reconstruction, Mousa et al. [20] reported postoperative complications in 45% of patients, of which 29% occurred after prior neoadjuvant chemotherapy and 25% after prior radiotherapy. In 30% of patients, revisional surgery (closure of wound, debridement, exchange or removal of implant) was needed. In our cohort, the overall complication rate was 38%, which might be due to the high percentage of women participating in the study after treatment for prior breast cancer. With the exception of 2 women, all patients would elect the same procedure again. The number of severe complications such as flap loss after autologous reconstruction is rather high. The operations took place in different hospitals all over Germany. In order to guarantee high oncologic safety and the best possible aesthetic outcome with low complication rates, these complex operations should only be performed in centers with interdisciplinary teams of oncologic and plastic surgeons [21, 22]. But the patient's wish is not regulated further, for instance by limited insurance coverage.

In spite of complications, most women after prophylactic mastectomy reported high satisfaction with their decision in the meta-analysis of Lostumbo et al. [5]. This is in accordance with our findings. Even in cases of dissatisfaction with the cosmetic outcome, all our patients would opt to undergo the risk-reducing operation again.

Satisfaction with cosmetic outcome was higher after autologous reconstruction, which is in accordance with the literature [17, 23–27]. But due to the small numbers in our analysis and differences in preconditions for the individual woman, this implies no general advice to prefer one method over the other. In our study, patients after unilateral breast cancer reported higher satisfaction compared to healthy patients. Although this was expected, one other group found partly different results. Kazzazi et al. [24] describe higher satisfaction among healthy individuals or after bilateral breast cancer with mastectomy and reconstruction compared to those with unilateral breast cancer with bilateral mastectomy and reconstruction. As an explanation, lack of time for making the decision for contralateral mastectomy is suggested.

Most study participants reported improvement in quality of life primarily due to reduction of anxiety. Those with unchanged quality of life reported having taken a rational decision without feeling stressed by anxiety before the operation. With a mean follow-up time of 14.5 years, a retrospective study by Frost et al. [28] found satisfaction with the procedure in 70% of all patients. More-

over, increase in emotional stability and decrease in stress was perceived in about 25% of patients. A number of smaller studies with a short follow-up of 1–2 years provide similar data [7, 28–31], but long-term prospective studies are still needed for the comprehensive counseling of patients at high risk for breast cancer.

The strength of our analysis lies in the qualified telephone interview conducted by a breast surgeon. Especially for patients with prior unilateral breast cancer, it is sometimes challenging to answer questions on intention, number of surgeries, or type of complication. A limitation of our study is the restricted follow-up of the 1,319 families at our center. Not all families are represented with at least 1 participant in our intensified surveillance program. Therefore, underestimation of the rate of uptake of prophylactic mastectomies is possible. Moreover, our sample is too small to compare the impact of type of mastectomy and reconstruction on complications and quality of life. It should also be mentioned that no validated questionnaire was used to enquire about patient satisfaction.

Prophylactic mastectomy is the most effective procedure to improve survival rates in healthy carriers of a mutation in *BRCA1/2* and possibly also in unilaterally affected carriers. As we can confirm, psychosocial benefits outweigh possible early and late side effects of the surgery. Knowledge on genetic and non-genetic risk modifiers might help to define individual risk and the timing of the procedure in the future.

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Statement of Ethics

The study protocol has been approved by the research institute's committee on human research.

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Author Contributions

K.Ke.: Conception of the work, analysis and interpretation of data, writing of the manuscript, final approval of the version to be published; C.M.: conception of the work, acquisition, interpretation of the data, final approval of the version to be published; K. Ka.: conception of the work, acquisition, interpretation of data, critical revision of the manuscript for important intellectual content, final approval of the version to be published; all other authors: acquisition of data, critical revision of the manuscript for important intellectual content, final approval of publication.

Disclosure Statement

The authors have no conflicts of interest to declare.

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