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The psychological impact of breast reconstruction after prophylactic or therapeutic mastectomy for breast cancer

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Citation

Gopie, J. P. (2013, January 9). *The psychological impact of breast reconstruction after prophylactic or therapeutic mastectomy for breast cancer*. Retrieved from <https://hdl.handle.net/1887/21092>

Version: Corrected Publisher's Version

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Issue Date: 2013-01-09

CHAPTER 1 INTRODUCTION



1. Breast cancer

In the Netherlands breast cancer is the most common type of cancer in women with a lifetime risk of 1 out of 8. Every year there are more than 13,000 new cases mostly occurring in women older than 50 years of age [1]. Therefore, since 1989 women aged between 50 and 75 years old have been invited to participate biannually in a national breast cancer screening program using mammography which has proven to be effective in the early detection of breast cancer and the reduction of mortality [2-4]. Several treatment options are available for breast cancer, such as surgery, chemotherapy, radiotherapy and hormonal therapy. Despite the introduction of breast conserving therapy with or without neo-adjuvant treatment, mastectomy is still performed in about 46% of all cases [5], while more recent results have shown that long-term survival rates are similar after breast conserving therapy including radiotherapy [6].

About 5% to 10% of all breast cancer cases are caused by a genetic predisposition [7]. Women from families with a BRCA1/2 mutation have a significantly increased cumulative lifetime risk for developing breast cancer (39-85%) as well as ovarian cancer (10-63%) [8-11]. These women are offered a specific breast surveillance program including an annual MRI-scan, a mammography and clinical breast examination. Women at high risk for breast cancer based on their family history are also offered a specific breast surveillance program, as suggested by the Dutch Breast Cancer Guidelines 2012 [12;13]. As breast cancer screening programs may detect breast cancer at an early stage but cannot prevent it, prophylactic mastectomy may also be discussed with these high risk patients as an alternative option to reduce the risk for developing breast cancer [14-16].

1.1. Therapeutic mastectomy and breast reconstruction

Mastectomy can have a significant impact a woman's body image and self-identity, including feelings of abnormality, depressive symptoms, loss of wholeness, and mourning for the lost breast [17-21]. Breast reconstruction (BR) can significantly improve patient satisfaction and body image after mastectomy [22-27]. However, general psychological outcomes do not differ significantly between women with and without BR after mastectomy [28-32]. Recently, it has been found that BR is associated with decreased breast cancer mortality compared to women undergoing mastectomy only, but this is more likely to be explained by socioeconomic factors and access to health care than to oncologic factors [33;34].

The number of patients receiving BR after mastectomy ranges from 10% to 40% but is still increasing. However, there is a great ethnic and geographic variation, for instance non-white women and patients from deprived or rural areas are less likely to undergo BR [35]. In the Netherlands, the estimated uptake of BR after therapeutic mastectomy is about 20%, indicating the majority of patients does not receive BR [36].

This thesis focuses on the impact of two different types of BR after mastectomy: the most commonly performed BR method using silicone implants and the most advanced BR type using abdominal tissue; the Deep Inferior Epigastric artery Perforator (DIEP) flap (Figure 1). There was very little data on psychosocial outcomes regarding DIEP flap BR available at the beginning of this study [37-41]. Therefore, it was investigated what possible benefits

and disadvantages this BR method would bring patients, in comparison to implant BR. The effect of demographic and other clinical variables on the psychosocial outcomes after BR was also investigated.

The following paragraphs provide an overview of therapeutic and prophylactic mastectomy, the types and timing of BR, psychosocial aspects related to the decision to undergo BR and the psychosocial outcomes after BR. In the final paragraph, the aims and research questions of this thesis are described.

1.2. Prophylactic mastectomy and breast reconstruction

Prophylactic mastectomy (PM) is considered to be an effective method for decreasing the breast cancer risk of high risk women significantly with a risk reduction of more than 90% [14-16;42;43], but there is insufficient data to support an improvement in survival rates after PM [44-46]. The combination of the cancer risk, fear of cancer and increasing possibilities for BR has popularized this risk-reducing surgery. More than ten years ago 55% of the Dutch unaffected high risk patients chose bilateral PM [43], but more recently this percentage has decreased to 33% [47]. The reasons for a declining uptake of bilateral PM may be related to recent study results describing the risk for adverse effects on body image and sexuality [48-59]. In addition, more advanced diagnostic imaging techniques have become available, providing earlier detection of breast cancer development [60-65] and it is likely that this improved diagnosis may dissuade doctors and patients from choosing bilateral PM.

This said, the uptake of bilateral PM in the Netherlands is still high compared to the mean international uptake of 18% [47;66] and only the United States of America (36%) and the United Kingdom (40%) have a higher uptake rate. The uptake is lowest in Poland (3%), Israel (4%) and Norway (5%). Regarding contralateral PM in high risk women with a history of breast cancer, the uptake of 53% in the Netherlands is also high, compared to the average international uptake of 27% [46;67]. The large variance in uptake may reflect cultural differences in which both patients and clinicians may play a role.

Currently, BRCA1/2 mutation carriers are advised to undergo prophylactic bilateral salpingo-oophorectomy (PBSO) to reduce the risk for ovarian cancer as well as the prevalence of breast cancer and to improve the survival rate in premenopausal BRCA1/2 mutation carriers [44;68-71]. BRCA1 mutation carriers are recommended to undergo PBSO between 35 to 40 years of age, whereas for BRCA2 mutation carriers this is advised between the age of 40 and 45 years as recommended by the Netherlands Foundation for the Detection of Hereditary Tumours (STOET) [72]. However, PBSO may have a profound effect on psychological wellbeing as it induces the pre-menopause, which may result in adverse psychological, somatic and sexual consequences, including vasomotor symptoms, vaginal dryness and decreased libido [73-75].

1.3. Types of breast reconstruction

In general, three types of BR are available: with silicone implants, autologous tissue, or a combination of both. BR, using a silicone implant is the most commonly performed [76;77] and is usually preceded by the insertion of a tissue expander during the first stage of the

reconstruction, which is gradually inflated to expand the breast skin and muscle [78], and after a few months is replaced with the definite implant.

Several autologous BR techniques exist, commonly including skin, fat and muscle tissue from a distant donor site, such as the latissimus dorsi myocutaneous (LD) flap from the back [79]. The transverse rectus abdominis myocutaneous (TRAM) flap includes skin, fat and muscle from the lower abdomen which is transferred to the chest wall [80], and the TRAM flap is either a pedicled or a free flap requiring a smaller proportion of the abdominal muscle. Other autologous BR techniques include the gluteal artery perforator (GAP) flap and the transverse myocutaneous gracilis (TMG) flap, which consist of skin and fat from the buttock and skin, fat and muscle from the medial thigh area [81;82], respectively. Currently, the most popular autologous BR method is the Deep Inferior Epigastric artery Perforator (DIEP) flap, using abdominal skin and fat, but leaving the abdominal muscles intact, which reduces the chance of abdominal muscle weakness or hernia [83]. However, it requires microsurgical expertise and for the reconstructive surgeon to have specialist knowledge, and this expertise is only available in specialized centers, resulting in long patient waiting lists and higher costs. In general, higher satisfaction rates and a better body image have been reported after autologous BR compared to implant BR, but more prospective studies are required to be conclusive [40;41;49;84-87].

1.4. Timing of breast reconstruction

BR can be performed either immediately, at the same time with mastectomy or delayed; months or years after mastectomy. A randomized controlled trial (RCT) investigating the specific impact of immediate versus delayed reconstruction found that three months postoperatively immediate BR was associated with better psychosocial outcomes compared to delayed or no BR [24]. As randomization to the type or timing of BR is generally seen as unethical with regard to withholding information and not observing patient preferences, no other RCT has been performed in this field since 1983. Cross-sectional and cohort studies have demonstrated that aesthetic outcome is generally better following immediate BR as typically the skin envelope and occasionally the nipple can be preserved [84;88;89]. Women with immediate BR may have less distress and a better body image, more self-esteem and may feel more sexually attractive as well [90]. However, with regard to the type of BR, more positive outcomes on body image and sexual satisfaction were found after delayed autologous BR [40;49;84;87]. The timing of BR is of great significance here, as women with delayed BR have lived for a period with only one or no breasts and therefore have a greater opportunity to experience improvement, as their body image and sexual satisfaction may be at the lowest point before they undergo BR. Furthermore, after delayed BR the complication risk has been found to be lower compared to immediate BR [88].

Generally, the timing of BR does not have an impact on the incidence of recurrent breast cancer and women undergoing immediate BR generally experience no delay in adjuvant treatment compared to women without undergoing BR [33;91-93].

2. Psychological aspects of Breast Reconstruction

2.1. Decisional aspects of breast reconstruction

The decision for the type of BR can be influenced by different factors such as surgeon's preferences and expertise, treatment characteristics (therapeutic or prophylactic indication for mastectomy, timing of BR), and patient characteristics [51;77;94-99]. Some patients are limited in their reconstructive options by clinical and logistic circumstances, such as having insufficient autologous tissue or being restricted by long waiting lists [96]. However, some demographic conditions facilitate the access to BR: being younger, Caucasian, higher educated, wealthier and more often married or in a relationship [31;96;98-100].

Women generally choose BR because they feel too young to live without breasts, want to avoid wearing an external prosthesis, and wish to feel feminine and self-confident [96;98;99]. Common reasons not to choose BR are: feeling reconstruction is not essential for physical and emotional well-being, uncertainty about the procedure and not wanting anything unnatural in the body [96;98].

A lack of information and unrealistic expectations regarding the outcome of BR are also generally associated with regret or low satisfaction with the end result of BR [21;49;95;101-104]. Therefore, it is extremely important to inform patients as comprehensively as possible about the options regarding the types of BR and possible outcomes. Currently, there is no standardized information provided regarding BR options for patients, and, one study demonstrated that autologous BR was chosen by active information seekers and patients who referred themselves to a reconstructive surgeon [105]. This suggests that less independent decision-makers are less aware of the different reconstructive options and as a consequence, due to the increased risk of not selecting the optimal option may be less satisfied with their decision.

2.2. Complications after breast reconstruction

Implant BR can be performed either as a one-stage procedure (direct insertion of prosthesis) or a two-stage procedure (insertion of tissue expander followed by replacement with a definite implant). Presently, the two-stage procedure is generally performed. This procedure may take months as tissue expansion requires several months before the expander can be replaced with the implant. The overall short and long-term complication rates after implant BR vary from 18% to 51% [106-110]. Complications like infections, seroma and hematoma occur in 15% to 39% of the cases, of which 3% to 20% result in implant removal in the short-term [107;109].

Regarding autologous BR, free perforator flaps are preferred as there is less interference with muscle tissue and therefore donor site complications are minimized [76]. The most preferred free perforator flap for BR is the DIEP flap. The overall short and long-term complication rates after autologous BR vary between 32% and 43% [108;111]. Common immediate complications following DIEP flap BR are hematoma, seroma and partial flap necrosis occurring in about 2%, 5% and 15%, respectively, and in experienced hands total flap loss occurs in about 2% of DIEP flap reconstructions [112-114].

The chance for general failure of BR depends on the type of prosthesis used, the reconstruction method, and on risk factors for wound healing problems such as obesity, smoking, hypertension and pre- or postoperative radiotherapy [107;115-117]. Postoperative radiotherapy increases the risk of major complications, in particular after implant BR [106;116]. Postoperative complications can be an important indicator of dissatisfaction with reconstruction [118;119].

2.3. General quality of life

In general, the overall quality of life does not appear to differ between women with BR and women with mastectomy only [27;29;31;120-126]. One study found that women with BR even had a poorer wellbeing compared to women with mastectomy only, for which age might be a contributing factor, as the women with BR were significantly younger [30]. The general quality of life in these studies usually includes parameters such as distress or mood disturbances and overall wellbeing. It is more likely that other psychosocial aspects are affected, such as the altering body image and consequent effects on intimacy and the relationship, which is underlined by in depth-interview studies regarding the personal experiences of patients [54;56;97;101;127-130]. However, it remains relevant to correct for the overall quality of life when investigating these outcomes as they highly correlate with each other [131-134].

2.4. Body image

Conflicting results regarding body image after BR have been reported, with most studies having found no substantial differences between women who had received BR and women who had undergone mastectomy only [29;31;121;135-139]. Other studies reported better body image in women who had received BR [22;24;26;27;122;140;141]. For high risk women who are treated with PM and BR, body image is commonly negatively affected [48-50;57;58]. An explanation for this could be that losing the own healthy breasts without having had breast cancer, and directly exchanging them for reconstructed breasts might reduce satisfaction with appearance, self-esteem and self-consciousness.

The conflicting results regarding body image after BR could also be explained by methodological issues, as most studies had a retrospective design and could therefore not compare baseline scores with postoperative scores. It is also necessary to further investigate predictors of the patient evaluation of body image [142], therefore prospective studies are needed on the predictors of body image.

2.5. Sexual satisfaction and the partner relationship

Sexuality can be complex after breast cancer, as sexual changes can be caused by clinical factors, such as the influence of hormonal and chemotherapy with consequent menopause. A range of physical changes, including dyspareunia, fatigue, vaginal dryness, loss or decreased sexual desire or pleasure and numbness of the breasts, have been reported as a consequence of breast cancer treatment [121;143-150]. Of the BRCA1/2 mutation carriers 35% to 74% opts for PBSO to considerably lower the risk of ovarian cancer [47;151], but this

can, however, induce menopause and cause sexual side-effects, such as vaginal dryness, greater discomfort, and less satisfaction with sexual activities, although most complaints tend to decrease over time [152]. Psychosocial changes regarding sexuality include a fear of loss of fertility, negative body image, loss of femininity and attractiveness, depression and anxiety [143;153-155].

The quality of the partner relationship appears to be the strongest predictor of sexual satisfaction, sexual functioning and sexual desire compared to the physical or chemical changes due to cancer treatment [146;156;157]. If women can discuss their sexual practices with their partner, they are more able to manage changes in their sexual relationship [158]. After BR, sexual functioning has not generally been found to differ between breast cancer patients who had mastectomy only or with BR [22;24;29;31;121;122;125;137-140;159]. However, in high risk women who had PM, adverse sexual effects have been found in a substantial proportion of the patients [48-56].

The specific impact of BR on the partner relationship has received relatively little attention world-wide. A Franco-British study regarding patients' and partners' satisfaction with BR, showed satisfaction was related to the level of preoperative information, type of reconstruction and cosmetic result [160]. This suggests that it is important that further research should be conducted on the impact of BR on partner relationship satisfaction.

2.6. Patient regrets

About 18% of breast cancer survivors regret having had BR [161]. Regrets after BR are associated with a lack of information and unrealistic expectations regarding the outcome, as described previously [21;49;95;101-104]. In addition, women who are more concerned about the future or who had problems in communicating with their doctors are more likely to experience regret five years after cancer treatment [161]. Unaffected high risk women who underwent bilateral PM are less likely to report feelings of regret, which suggests that the relief from the reduced breast cancer risk outweighs the negative side effects of bilateral PM, such as pain, discomfort and adverse sexual effects [49;50;54;162].

3. Aims and outline of the present thesis

The Leiden – Rotterdam collaboration on breast cancer and the psychological issues of BRCA mutation carriers has started over 15 years ago [49;58;95;163-183]. Distress surrounding presymptomatic testing for BRCA1/2 was investigated, and high post-test anxiety was detected in 20% of the mutation carriers and in 35% of their partners [171]. Mutation carriers opting for PM had significantly higher distress levels than those opting for surveillance. In addition, adverse effects in body image and intimacy were observed in women who underwent PM combined with BR [49;163;169;175]. However, distress appeared to decline over time [58;164;169]. More recent studies of Den Heijer et al. showed that low self-esteem and feelings of stigmatization, increased distress and that communication regarding cancer within the family was associated with a reduced sense of vulnerability and less distress [167;168].

The current study aimed to expand this field of research and to explore patient motivation for BR and the specific psychological impact of this surgery on psychological distress, body image, sexuality and the partner relationship. This could increase the body of evidence to support a tailor-made psychosocial care-program for women dealing with either mastectomy after breast cancer or with prophylactic mastectomy.

3.1. Aims and research questions

In our study patients with implant and DIEP flap BR were included as our general aim was to prospectively investigate the psychosocial impact of BR after mastectomy comparing patients with implant and DIEP flap BR. At first, the decision-making process before surgery was explored, to investigate factors or thoughts related to unrealistic expectations. Secondly, our aim was to identify possible demographic, clinical and psychological risk factors that are related to a decreased psychosocial functioning.

The research questions were:

- What are the motives to opt for either implant or DIEP flap BR? (Chapter 2)
- To what extent do women make an independent decision regarding the type of BR? (Chapter 3)
- What is the short-term impact of complications after BR? (Chapter 4)
- What is the long-term impact of complications after BR? (Chapter 5)
- What is the impact of delayed BR on body image and the sexual and partner relationship satisfaction? (Chapter 6)
- What is the impact of prophylactic mastectomy with immediate BR on body image and the sexual and partner relationship satisfaction? (Chapter 7)

3.2. Study procedure

The study was a multi-center prospective follow-up study and the participants were women who opted for post mastectomy reconstruction after breast cancer (n=152) and healthy women who chose prophylactic mastectomy with BR because of an increased hereditary risk for developing breast cancer (n=50, Figure 2). Reconstructions were either implant or DIEP flap based, and were immediate or delayed. Exclusion criteria were:

- A BR in the past
- A detection of recurrence or metastasis of breast cancer during the study period, and
- Not being able to understand and speak the Dutch language sufficiently.

Patients were approached between December 2007 and May 2010 at the Leiden University Medical Center, Erasmus University Medical Center Rotterdam, Daniel den Hoed Cancer Center Rotterdam, Haga Teaching Hospital The Hague, Rijnland Hospital Leiderdorp, the Lange Land Hospital Zoetermeer, Hospital Walcheren, Admiraal de Ruyter Hospital Goes and at the Hospital Zorgsaam Terneuzen. Ethics approval was obtained from all participating hospitals..

Before their operation, an invitation letter explaining the procedure and purpose of the study, an informed consent, and a prepaid envelope were sent to all women on the BR

waiting lists of the participating hospitals. If patients did not respond within two weeks, a reminder was sent. Patients who returned their completed consent form received a self-report questionnaire that they had to complete before their operation. They were requested to complete the same questionnaire post-surgery, after 6 months and at the end of the BR procedure (21 months). In addition, questions regarding distress were sent at 1 month and 12 months post-surgery as well and patients were called by telephone to ask for the occurrence of complications and pain symptoms (Figure 3). After surgery, patient-reported clinical characteristics (including complications) were checked in the medical records.

The questionnaires included demographic information (e.g. age, having a partner or children, educational level), clinical data (e.g. indication for mastectomy, body mass index) and psychological assessments regarding general quality of life, anxiety, depression, cancer-specific distress, body image, sexual satisfaction and partner relationship satisfaction. At the final measurement patient satisfaction regarding the aesthetic result and complications experienced during the whole BR process were also requested. The content and psychometric properties of the self-report questionnaires are described in detail in the relevant chapters.

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Figure 1. Implant (A) and DIEP flap (B) breast reconstruction

Figure 2. Patient inflow

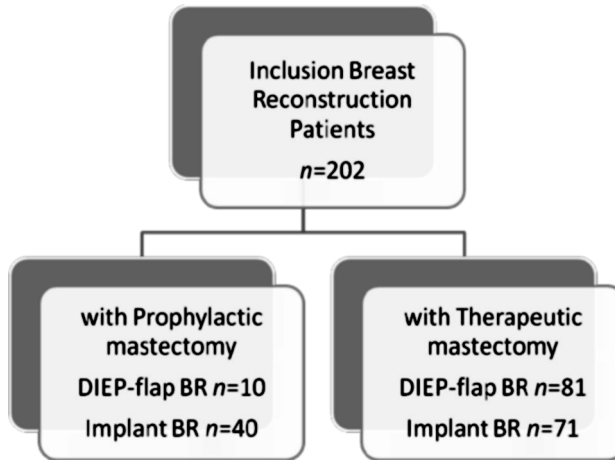


Figure 3. Timing of measurements

