Optimizing breast reconstructive surgery in the Netherlands using clinical audit data

Bommel, A.C.M. van

CHAPTER 6

Discrepancies between surgical oncologists and plastic surgeons in patient information provision and personal opinions towards immediate breast reconstruction

A.C.M. van Bommel
K. Schreuder
R.K. Veenstra
K.M. de Ligt
M.T.F.D. Vrancken Peeters
J.H. Maduro
S. Siesling
M.A.M. Mureau

Ann Plast Surg. 2018 Oct;81(4):383-388.

ABSTRACT

Background: Immediate breast reconstruction (IBR) may improve quality of life of patients receiving mastectomy. However, a significant hospital variation exists in the use of IBR due to various reasons. To better understand this variation, the present study investigated preoperative information provision to patients and personal opinions of surgical oncologists and plastic surgeons towards potential contra-indications for IBR.

Methods: An online survey (35 questions) was developed including questions on respondent demographics, information provision to the patient about IBR and potential contra-indications by IBR technique.

Results: One-hundred-eighty-nine physicians participated: 118 surgical oncologists and 71 plastic surgeons. All clinicians discussed the possibility of IBR with their patients. Complications (79% versus 100%, P<0.001) and esthetic outcomes (83% versus 99%, P = 0.001) were discussed less frequently by surgical oncologists than by plastic surgeons. Patient age >75 years, breast size >D-cup, BMI >40 kg/m^2, smoking (for implant reconstruction), pulmonary/cardiac comorbidities (for autologous reconstruction) and radiotherapy were considered a contra-indication more frequently by plastic surgeons. In contrast, surgical oncologists reported tumor stage (≥cT3), nodal stage (≥cN2) and chemotherapy more frequently to be a contra-indication for IBR.

Conclusion: We observed that all respondents discussed the possibility of IBR with their patients, whereas patient-tailored information was given more frequently by plastic surgeons. Physicians differed in their opinions towards contra-indications for IBR, with plastic surgeons reporting patient-related risk factors for wound healing problems and surgical oncologists reporting oncological contra-indications more frequently. Consensus between physicians regarding contra-indications for IBR may optimize patient counseling and shared decision-making.

INTRODUCTION

In the Netherlands, about 15,000 new breast cancer patients are diagnosed annually, which makes it the most frequently diagnosed cancer in women.[1] About 40% of all surgically treated patients receive a mastectomy.[2] According to current guidelines, immediate breast reconstruction (IBR) has to be considered in every patient who is planned for mastectomy.[3,4] IBR does not compromise the oncological outcomes,[5] while resulting in improved quality of life with better psychological and functional wellbeing in the majority of patients.[6–9]

In general, breast reconstruction can be performed with an implant, autologous tissue or using a combination of both. However, implant reconstructions are performed most frequently.[10–13] These different techniques vary in complexity and operation time, complication rates, recovery period and esthetic outcomes, making not every technique suitable for every patient, depending on comorbidities, local anatomy and previous surgery or other treatment, and patient preferences.[14–16]

The NABON Breast Cancer Audit (NBCA) is a nationwide multidisciplinary audit measuring quality of breast cancer care in the Netherlands.[17] Current data show that the mean percentage of patients undergoing IBR in the Netherlands is rather low given every patient planned for mastectomy should be considered for IBR; 17% for invasive breast cancer and 43% for ductal carcinoma in situ (DCIS).[2,17] Immediate implant based reconstructions were performed most frequently (89%). Autologous or a combination of autologous and implant reconstructions were both used in less than 5% of the patients who underwent IBR for invasive breast cancer.[11] Moreover, large variation in the use of IBR between hospitals in the Netherlands was previously shown by our group; 0–64% and 0–83% for invasive breast cancer and DCIS, respectively.[11] Numerous factors are considered contra-indications for the use of IBR which may affect its current use. Patient characteristics such as older age, high Body Mass Index (BMI), smoking status, comorbidities have been reported to affect the probability to receive IBR.[18,19] In addition, tumor factors as histology, larger tumor size and lymph node involvement also have an impact on whether or not IBR is performed as well as the need for adjuvant treatments.[6,18,20–22] Furthermore,

differences in care processes between hospitals or physician preferences have been suggested to have a relationship with the use of IBR.[18,23,24]

In the Netherlands, every patient diagnosed with breast cancer is discussed in a multi-disciplinary team prior to treatment. The final decision to perform IBR is predominantly made by surgical oncologists and plastic surgeons together with the patient. The surgical oncologist performs the mastectomy (i.e., oncological resection) and the plastic surgeon performs the breast reconstruction thereafter. Physicians' personal attitudes and the weighing of possible contra-indications may affect this decision-making process. Moreover, the preoperative information given to patients may affect patient preferences.

To better understand the existing large variation in the use of IBR and to ultimately improve breast cancer care, it is important to learn about the various attitudes of physicians in the decision-making process of offering patients IBR. Therefore, the aim of the current study was to investigate the practice of preoperative information provision to patients by surgical oncologists and plastic surgeons and their personal opinion towards potential contra-indications for different types of IBR in patients with breast cancer requiring mastectomy.

MATERIALS AND METHODS

Respondents

Surgical oncologists and plastic surgeons with special interest in breast cancer care were identified through clinical networks of the Netherlands Comprehensive Cancer Organization (IKNL) and were invited to participate in a self-administered survey. The responses were collected over an 8-month period from July 2014 to February 2015. To maximize response rates, five reminders were sent approximately after 1.5 months, 3 months, 5 months, 7 months and 7.5 months.

Questionnaire

The survey consisted of 35 questions divided in three sections. First, the respondents' demographic information was asked. In the second section the provision of preoperative information to patients about IBR or delayed reconstruction, possible complications, expected esthetic outcomes and reconstructive techniques was investigated. Finally, respondents were asked about their personal opinion towards contra-indications such as patient characteristics, tumor characteristics and neo-adjuvant or adjuvant treatments. If one responded positively on a specific contra-indication, a drop-down menu opened asking for which specific reconstruction technique and for which sub-group of patients the contra-indication was applicable (for example, age below 35, age 35–55, age 56–75, age >75). Contra-indications were chosen based on evidence in current literature and expert-based opinions. We decided not to include delayed breast reconstruction in the questionnaire, as we believe that treatment approaches and the patient population may be different compared to patients receiving IBR. Members of the scientific committee of the NBCA reviewed and piloted the survey. The survey was administered anonymously with the use of SurveyMonkey, an online secure web-based database.[25] None of the respondents received an offer for an incentive for completion of the survey.

Statistical analysis

Demographic characteristics of the respondents were analyzed for surgical oncologists and plastic surgical oncologists separately. Next, the information provided to patients by surgical oncologists and plastic surgeons was evaluated. Reconstructive techniques were divided into three categories: implant reconstruction, autologous reconstruction, or combination of both implant and autologous reconstruction. The opinions about potential contra-indications per reconstructive technique reported by the respondents were categorized and results of surgical oncologists and plastic surgeons were compared. All statistical analyses were performed using SPSS 20.0 (IBM-SPSS, Inc., Chicago, IL).

RESULTS

Respondents

In total, 41% (193/466) physicians responded. Four of the 193 surveys (2%) were excluded from analyses due to data incompleteness resulting in 118 surgical oncologists and 71 plastic surgeons participating, representing 82 of the 89 hospitals in the Netherlands. Plastic surgeons were significantly younger and on average had less working experience (**Table 1**).

Table 1. Demographic characteristics of respondents (118 surgical oncologists and 71 plastic surgeons) on questionnaire regarding breast cancer management process.

		Surgical oncologist		Plastic surgeon		Total	
		n=118	%	n=71	%	n=189	%
Gender	Male	59	50%	42	59%	101	53%
	Female	59	50%	29	41%	88	47%
Age, mean in years (range)		48 (35-65)		45 (30-64)		48 (30-65)	
Working experience, mean in years (range)*		13 (2-33)		10 (1-26)		12 (1-33)	
Type of hospital**	District hospital	42	36%	11	15%	53	28%
	Teaching hospital	63	53%	48	68%	111	59%
	University hospital	12	10%	12	17%	24	13%
Breast cancer patients treated per year	0 - 50	20	17%	47	66%	67	35%
	51 - 100	61	52%	19	27%	80	42%
	101 - 150	25	21%	3	4%	28	15%
	>150	12	10%	2	3%	14	7%

* Excluding time as registrar.
** One respondent left the question unanswered.

Preoperative Information Provision

All surgical oncologists discussed the possibility of IBR and delayed reconstruction with patients undergoing a mastectomy. Surgical oncologists significantly less frequently discussed complications (79% versus 100%, P<0.001) and esthetic outcomes (83% versus 99%, P=0.001) compared to plastic surgeons. Information provision to patients regarding the difference between IBR and delayed

reconstruction did not differ significantly between surgical oncologists and plastic surgeons (97% versus 99%, respectively, P=0.594). This was also true regarding advantages and disadvantages of the timing of reconstruction (97% versus 99%, respectively, P=0.589), and consequences of other therapies such as adjuvant therapy (84% versus 91%, respectively, P=0.130). Forty-eight percent of the surgical oncologists discussed all reconstructive techniques with their patients, versus 85% of the plastic surgeons (P<0.001). The remaining surgical oncologists (52%) tended to discuss only techniques offered at their own institution (29%) or reconstructive techniques that they regarded relevant to the specific patient (23%).

Patient related contra-indications

Table 2 provides a general overview of factors considered a contra-indication by surgical oncologists and plastic surgeons. Age was not considered a contra-indication for any of the IBR types except age >75 years. Specifically for autologous reconstructions, a considerable percentage of the plastic surgeons (38%) reported age >75 years as contra-indication compared to 19% of the surgical oncologists. For implant reconstructions, older age was less frequently considered a contra-indication by both surgical oncologists (9%) and plastic surgeons (15%) when compared to autologous reconstructions. Smoking was a contra-indication for IBR for surgical oncologists in 60%, 56% and 41% for autologous, combination autologous-implant and implant reconstructions, respectively. These figures were 48%, 45% and 47%, respectively, for plastic surgeons. About 14–17% of the plastic surgeons, depending of the reconstruction technique, reported large breast size (>D-cup) to be a contra-indication compared to 7–8% of the surgical oncologists. No significant differences between reconstruction techniques were found. Approximately 65% of the plastic surgeons and 40% of the surgical oncologists found BMI >40 kg/m^2 a contra-indication for IBR. A BMI <18.5 kg/m^2 was reported as contra-indication by approximately 13–18% of the plastic surgeons compared to approximately 3% of the surgical oncologists.

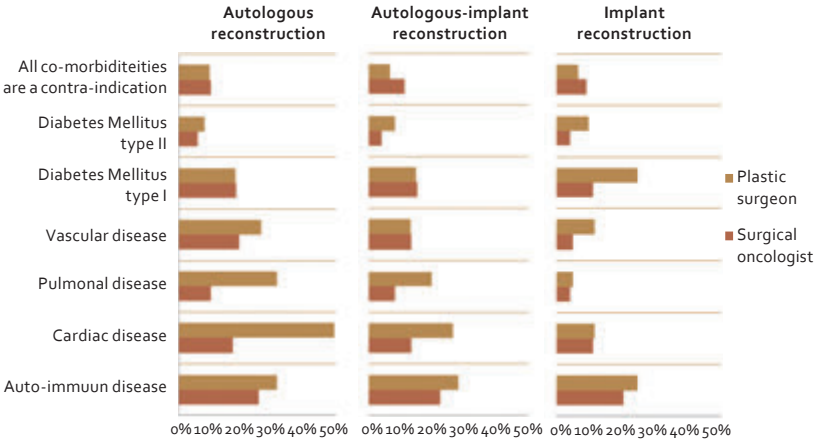
Table 2. Factors affecting the indication for immediate breast reconstruction reported by 189 surgical oncologists (n=118) and plastic surgeons (n=71) involved in breast cancer care.

		Surgical oncologist		Plastic surgeon		Total		
Contra-indication		**n=118**	**%**	**n=71**	**%**	**n=189**	**%**	**P-value***
Age	Yes	24	24%	26	43%	50	31%	0.015
	No	75	76%	35	57%	110	69%	
	Missing	19		10		29		
Smoking	Yes	67	66%	36	58%	103	63%	0.327
	No	35	34%	26	42%	61	37%	
	Missing	16		9		25		
Breast size	Yes	19	19%	26	43%	45	28%	0.001
	No	83	81%	35	57%	118	72%	
	Missing	16		10		26		
Body Mass Index	Yes	63	63%	52	85%	115	71%	0.002
	No	37	37%	9	15%	46	29%	
	Missing	18		10		28		
Co-morbidities	Yes	70	71%	53	87%	123	77%	0.024
	No	28	29%	8	13%	36	23%	
	Missing	20		10		30		
Tumor stage	Yes	65	59%	29	45%	94	54%	0.064
	No	45	41%	36	55%	81	46%	
	Missing	8		6		14		
Nodal stage	Yes	44	75%	18	67%	62	72%	0.448
	No	15	25%	9	33%	24	28%	
	Missing	59		44		103		
Neo-adjuvant or adjuvant treatment	Yes	21	20%	26	42%	47	28%	0.003
	No	82	80%	36	58%	118	72%	
	Missing	15		9		24		

* Using Chi-square tests to calculate differences between surgical oncologists and plastic surgeons.

About 10% of the respondents reported that comorbidities in general should be regarded as a contra-indication for IBR, irrespective of reconstructive technique. Overall, auto-immune diseases were considered to be a contra-indication by both surgical oncologists and plastic surgeons. The most striking differences between surgical oncologists and plastic surgeons were found for autologous reconstructions. Forty-nine percent of the plastic surgeons compared to 17% of the surgical oncologists mentioned cardiac comorbidities as contra-indication for autologous reconstructions. For pulmonary comorbidities this was the case in 31% of the plastic surgeons versus 10% of the surgical oncologists (**Figure 1**).

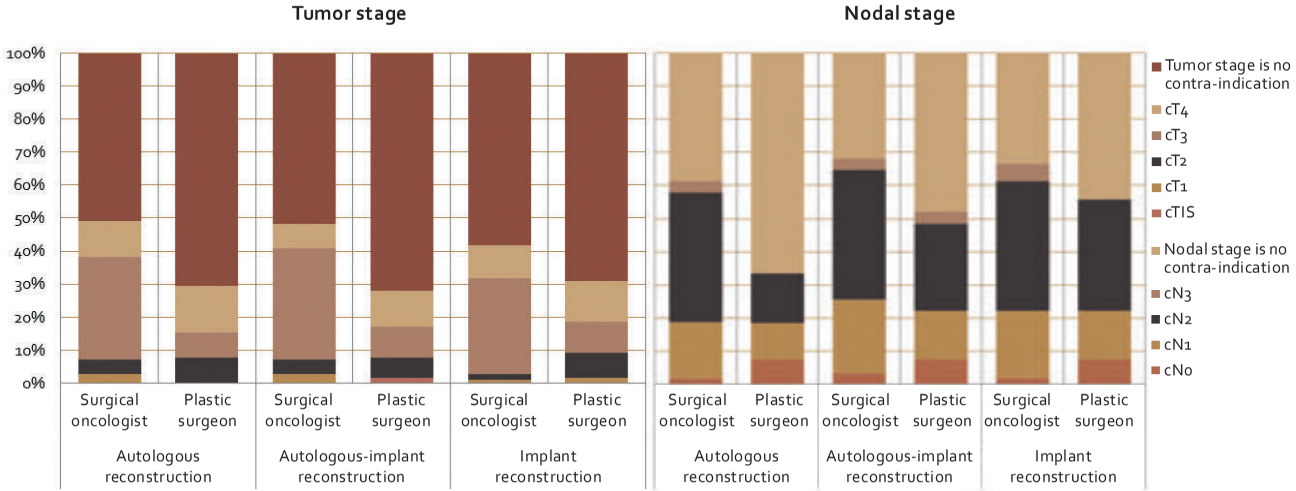
Figure 1. Comorbidities indicated as contra-indication per reconstructive technique, separated for surgical oncologists and plastic surgeons.



Oncological related contra-indications

In general, surgical oncologists reported tumor T-stage and nodal N-stage more frequently as a contra-indication for IBR compared to plastic surgeons. Surgical oncologists reported tumors clinical T_3 or larger for all three reconstruction techniques as a contra-indication (around 30%). Plastic surgeons had less agreement on T-stage; cT_4 was reported as contra-indication for all reconstruction techniques in 12%, and also T-stages T_2 and T_3 were reported by 8% of the plastic surgeons, see **Figure 2**.

Figure 2. Tumor T-stage and Nodal N-stage reported by clinicians as contra-indication, separated per reconstructive technique.



For the three reconstruction types, 39% of the surgical oncologists reported lymph node involvement ≥cN2 to be a contra-indication. Plastic surgeons showed a similar response for implant reconstructions (34%), although lower percentages were found for autologous and autologous-implant reconstructions (**Figure 2**).

Overall, surgical oncologists differed in their perspective of adjuvant treatments as contra-indication compared to plastic surgeons (**Table 3**). No difference between surgical oncologists and plastic surgeons was found for radiotherapy as contra-indication for immediate autologous reconstruction. However, in case of reconstruction using implants (either autologous-implant or implant reconstruction) radiotherapy was less often reported as contra-indication by surgical oncologists compared to plastic surgeons (**Table 3**).

Chemotherapy, neo-adjuvant and specifically adjuvant chemotherapy were more often considered to be a contra-indication for IBR by surgical oncologists compared to plastic surgeons. Adjuvant hormonal therapy was hardly reported as a contra-indication for IBR by any of the clinicians (≤2%, **Table 3**).

Table 3. Various treatments reported by clinicians as contra-indication, separated per reconstructive technique.

	Autologous reconstruction		Autologous-implant reconstruction		Implant reconstruction	
	Surgical oncologist	Plastic surgeon	Surgical oncologist	Plastic surgeon	Surgical oncologist	Plastic surgeon
Neo-adjuvant therapies are no contra-indication	7%	15%	7%	8%	6%	2%
Neo-adjuvant chemotherapy	4%	6%	4%	2%	4%	0%
Adjuvant therapies are no contra-indication	0%	8%	0%	3%	0%	2%
Adjuvant chemotherapy	7%	3%	7%	2%	5%	2%
Adjuvant hormonal therapy	1%	2%	1%	0%	1%	0%
Adjuvant radiotherapy	11%	10%	13%	23%	15%	36%

DISCUSSION

Hospital variation in IBR after mastectomy can partially be explained by variation in patient and tumor characteristics (i.e., case-mix factors) that cannot be altered.[11] In addition, differences in patient preferences may also be a cause of variation.[6,26] However, variation in IBR due to hospital organizational factors[18,24] or personal opinions towards IBR of individual physicians is undesirable.[26]

As found in the present study, surgical oncologists and plastic surgeons differ in their information provision to patients about IBR. More importantly, personal opinions towards IBR differ between surgical oncologists and plastic surgeons as well. Surgical oncologists more frequently reported cancer related factors to be a contra-indication for IBR compared to plastic surgeons, whereas the latter mentioned factors affecting complications or reconstruction failure more frequently.

Preoperative information provision

The Dutch, evidence-based NABON breast cancer treatment guideline recommends that every patient undergoing mastectomy should be considered for IBR.[3] Interestingly, in the present study all surgical oncologists discussed the possibility of IBR with their patients, while other studies reported lower rates of information provision about IBR, ranging from 23% in Japan[27] to 74% in the United States.[28] It seems justified that surgical oncologists inform patients about the existence and possibility of IBR and delayed reconstruction, while details about the reconstructive procedures, shared decision-making and patient expectations are managed by plastic surgeons, indicating that patients need to be referred to a plastic surgeon for complete and correct information on IBR.

Patient related contra-indications

Surgical oncologists in another study considered age (37%) as a factor affecting the decision to refer patients to the plastic surgeon for IBR.[28] Age has been described in literature as a factor significantly affecting the prevalence of IBR,[11,13–15,19,26] but also as a risk factor (age >55 years) for implant loss after IBR.[29] In the current study, we found that age was not considered as a major contra-indication by both professions,

except for patients aged over 75 years, which was more frequently reported by plastic surgeons compared to surgical oncologists. A possible explanation for this finding may be the assumption that older patients prefer not to undergo IBR. Another reason may be that older patients generally have more comorbidities and are therefore less eligible for IBR, specifically for more complex autologous reconstructions with potentially higher risk of complications. Smoking was considered an important contra-indication for all types of breast reconstruction by all physicians due to associated complications. In case of autologous reconstruction smoking leads to an increased risk of fat necrosis and wound healing problems, also of the donorsite,[30] and in implant reconstruction an increased risk of implant loss due to wound healing problems and infections was found.[29,31] It is therefore recommended to stop smoking 4–6 weeks prior to surgery.[32]

As expected, morbid obesity affected the decision-making process for all reconstructive techniques.[18,19,26] It is well-known from plastic surgery literature that obesity leads to an increased risk of complications of the breast reconstruction itself,[29,31,33] and therefore it was not a surprise plastic surgeons more frequently regarded obesity as a contra-indication compared to surgical oncologists. Besides BMI, plastic surgeons tended to report large breast size (>cup D) more frequently as contra-indication compared to surgical oncologists. Larger breast volume is associated with an increased risk of complications as skin flap morbidity, implant loss and reoperations.[34–36]

Comorbidities have been frequently reported in literature as contra-indications for IBR.[18,19,30,31,37] Plastic surgeons specifically reported cardiac and pulmonary comorbidities as contra-indications for autologous reconstruction because of the lengthy operative procedure with prolonged general anesthesia time leading to an increased risk of postoperative medical complications in these patients. Previous cardiac surgery has been suggested to be a predictor of major surgical complications.[30]

Oncological related contra-indications

Consistent with previous literature,[18] advanced tumor stage (cT3) and tumor positive nodes (cN2) were important contra-indications according to both groups.

However, surgical oncologists reported tumor and nodal stage more frequently as contra-indication compared to plastic surgeons. Potential reason could be that in cT4 tumors the skin is involved and should be excised as well as the need for radiotherapy of the chest wall, as well as in patients diagnosed with a T3N2 tumor. A survey among breast surgical oncologists and plastic surgeons in the UK reported that 26% of the surgical oncologists would not offer IBR in patients with stage IV disease.[38] Reasons were related to poor prognosis (31%), concerns about temporary cessation of systemic treatments (21%) and recovery time (17%).[38]

In the present study, (neo)-adjuvant therapies were not considered major contra-indications while literature suggests that adjuvant therapies such as chemotherapy and radiotherapy may affect IBR rates significantly.[18,22] The question in our survey enquiring about neo-adjuvant and adjuvant therapies may have been phrased not clearly enough, with respondents assuming that only neo-adjuvant therapies were asked for. Surgical oncologists more often regarded adjuvant chemotherapy a contra-indication for IBR compared to plastic surgeons, presumably because of fear of delay in chemotherapy administration.[28] However, a recent systematic review showed no clinically relevant delay in chemotherapy administration if a patient has undergone IBR, irrespective of type of reconstruction.[39]

Of the respondents who reported (neo)-adjuvant therapies as contra-indication, radiotherapy was considered a contra-indication specifically for implant reconstructions. Use of radiotherapy leads to a significantly higher reconstruction failure rate compared to if no radiotherapy is given,[40] reason for plastic surgeons not to perform IBR.[41] Radiotherapy is less detrimental to autologous reconstructions[42] and it is therefore not surprising that in this situation it was considered a less important contra-indication for this type of reconstruction. Another study showed that 19% of surgical oncologists answered they did not refer patients to a plastic surgeon if adjuvant radiotherapy was indicated.[28]

Our study had respondents from nearly all hospitals in the Netherlands, resulting in a large and representative sample of clinicians. Respondent characteristics differed slightly between surgical oncologists and plastic surgeons and may have affected

their opinions on contra-indications. In addition, recall bias may have occurred since the information was based on self-reports. The result that 100% of the surgical oncologists reported to preoperatively discuss the possibility of IBR with their patients may possibly be an overestimation due to socially desirable answers. Other factors that in literature have been suggested to have a relationship with the use of IBR, like socio-economic status and ethnicity, were not investigated in our study. However, we expect that these factors did not have an impact on the considerations of Dutch clinicians to offer a patient IBR. In the Netherlands, all patients have a healthcare insurance plan and postmastectomy IBR is always fully reimbursed.

Lastly, referral patterns and collaboration between disciplines involved in breast cancer care all around the world may differ from the Netherlands. However, we feel our results may be representative for attitudes of clinicians in countries with similar constructions between surgical oncologists performing breast cancer surgery and plastic surgeons performing breast reconstruction. Therefore, this study may be a good starting point to exalt the differences found to inspire further research and enable the development of guidelines for discussion and decision-making relevant to potential candidates for IBR.

Our findings suggest there are multiple opinions on selecting patients for IBR. Information provision to patients and participation in decision-making should not vary considerably between hospitals or clinicians from different specializations and ideally should not affect IBR rates. Patient selection is crucial to achieve favorable esthetic outcomes with improved quality of life and minimal complication rates. For every individual patient a new trade-off should be made based on her patient and oncological tumor characteristics and preferences, with some contra-indications more relevant compared to others. This process could be facilitated by evidence-based guidelines, patient decision aid tools and establishment of multidisciplinary teams, ultimately leading to consistent information provision from every discipline involved and optimization of shared decision-making. An evidence-based, multi-disciplinary breast reconstruction guideline is publicly available in English since 2015 to guide the decision-making process and to provide the information needed, hopefully resulting in a reduction of variation in personal opinions of physicians towards IBR.[41]

CONCLUSIONS

Reasons whether or not to perform IBR are multifactorial, with patient and tumor factors as most examined causes. The results of the current study gained insight into personal opinions of surgical oncologists and plastic surgeons towards IBR. The final decision to offer postmastectomy IBR was affected by multiple factors weighed differently by surgical oncologists and plastic surgeons involved. Oncological characteristics (tumor size and nodal status) were reported more frequently as contra-indication by surgical oncologists, while plastic surgeons mentioned risk factors and wound-associated problems (age >75, smoking in implant reconstructions, large breast size, BMI and comorbidities) more frequently.

Reaching consensus between surgical oncologists and plastic surgeons regarding contra-indications for IBR helps improving patient counseling and optimizing shared decision-making.

REFERENCES

1. Netherlands Comprehensive Cancer Organisation. http://www.cijfersoverkanker.nl [Accessibility verified September 14, 2017]
2. NABON Breast Cancer Audit. nbca.clinicalaudit.nl. [Accessibility verified September 14, 2017]
3. National Breast Cancer Organisation of the Netherlands, Guideline breast cancer. http://www.oncoline.nl. [Accessibility verified September 14, 2017].
4. National Collaborating Centre for Cancer; Early and locally advanced breast cancer: diagnosis and treatment. NICE guideline, February 2009.
5. Zhang P, Li CZ, Wu CT, et al: Comparison of immediate breast reconstruction after mastectomy and mastectomy alone for breast cancer: A meta-analysis. Eur J Surg Oncol 43:285-293, 2017
6. Jeevan R, Cromwell DA, Browne JP, et al: Findings of a national comparative audit of mastectomy and breast reconstruction surgery in England. J Plast Reconstr Aesthet Surg, 2014
7. D'Souza N, Darmanin G, Fedorowicz Z: Immediate versus delayed reconstruction following surgery for breast cancer. Cochrane Database Syst Rev:CD008674, 2011
8. Fang SY, Shu BC, Chang YJ: The effect of breast reconstruction surgery on body image among women after mastectomy: a meta-analysis. Breast Cancer Res Treat 137:13-21, 2013
9. Al-Ghazal SK, Sully L, Fallowfield L, et al: The psychological impact of immediate rather than delayed breast reconstruction. Eur J Surg Oncol 26:17-9, 2000
10. Leff DR, Bottle A, Mayer E, et al: Trends in Immediate Postmastectomy Breast Reconstruction in the United Kingdom. Plast Reconstr Surg Glob Open 3:e507, 2015
11. van Bommel AC, Mureau MA, Schreuder K, et al: Large variation between hospitals in immediate breast reconstruction rates after mastectomy for breast cancer in the Netherlands. J Plast Reconstr Aesthet Surg 70:215-221, 2017
12. Mennie JC, Mohanna PN, O'Donoghue JM, et al: National trends in immediate and delayed post-mastectomy reconstruction procedures in England: A seven-year population-based cohort study. Eur J Surg Oncol 43:52-61, 2017
13. Kamali P, Paul MA, Ibrahim AM, et al: National and Regional Differences in 32,248 Postmastectomy Autologous Breast Reconstruction Using the Updated National Inpatient Survey. Ann Plast Surg, 2017
14. Jagsi R, Jiang J, Momoh AO, et al: Complications After Mastectomy and Immediate Breast Reconstruction for Breast Cancer: A Claims-based Analysis. Ann Surg, 2015
15. Spear SL, Newman MK, Bedford MS, et al: A retrospective analysis of outcomes using three common methods for immediate breast reconstruction. Plast Reconstr Surg 122:340-7, 2008
16. Malata CM, McIntosh SA, Purushotham AD: Immediate breast reconstruction after mastectomy for cancer. Br J Surg 87:1455-72, 2000
17. van Bommel AC, Spronk PE, Vrancken Peeters MT, et al: Clinical auditing as an instrument for quality improvement in breast cancer care in the Netherlands: The national NABON Breast Cancer Audit. J Surg Oncol, 2016
18. Brennan ME, Spillane AJ: Uptake and predictors of post-mastectomy reconstruction in women with breast malignancy--systematic review. Eur J Surg Oncol 39:527-41, 2013
19. Butler PD, Nelson JA, Fischer JP, et al: Racial and age disparities persist in immediate breast reconstruction: an updated analysis of 48,564 patients from the 2005 to 2011 American College of Surgeons National Surgery Quality Improvement Program data sets. Am J Surg 212:96-101, 2016
20. Morrow M, Scott SK, Menck HR, et al: Factors influencing the use of breast reconstruction postmastectomy: a National Cancer Database study. J Am Coll Surg 192:1-8, 2001

21. Kruper L, Holt A, Xu XX, et al: Disparities in reconstruction rates after mastectomy: patterns of care and factors associated with the use of breast reconstruction in Southern California. Ann Surg Oncol 18:2158-65, 2011

22. Jagsi R, Jiang J, Momoh AO, et al: Trends and variation in use of breast reconstruction in patients with breast cancer undergoing mastectomy in the United States. J Clin Oncol 32:919-26, 2014

23. Frisell A, Lagergren J, de Boniface J: National study of the impact of patient information and involvement in decision-making on immediate breast reconstruction rates. Br J Surg 103:1640-1648, 2016

24. Schreuder K, van Bommel ACM, de Ligt KM, et al: Hospital organizational factors affect the use of immediate breast reconstruction after mastectomy for breast cancer in the Netherlands. Breast 34:96-102, 2017

25. SurveyMonkey https://nl.surveymonkey.com. [Accessibility verified September 14, 2017]

26. Weenk M, Wunschel P, Heine E, et al: Factors influencing the decision to pursue immediate breast reconstruction after mastectomy for breast cancer. Gland Surg 6:43-48, 2017

27. Takahashi M, Kai I, Hisata M, et al: The association between breast surgeons' attitudes toward breast reconstruction and their reconstruction-related information-giving behaviors: a nationwide survey in Japan. Plast Reconstr Surg 118:1507-14; discussion 1515-6, 2006

28. Stacey DH, Spring MA, Breslin TM, et al: Exploring the effect of the referring general surgeon's attitudes on breast reconstruction utilization. WMJ 107:292-7, 2008

29. Khansa I, Momoh AO, Patel PP, et al: Fat necrosis in autologous abdomen-based breast reconstruction: a systematic review. Plast Reconstr Surg 131:443-52, 2013

30. Fischer JP, Nelson JA, Au A, et al: Complications and morbidity following breast reconstruction--a review of 16,063 cases from the 2005-2010 NSQIP datasets. J Plast Surg Hand Surg 48:104-14, 2014

31. Ilonzo N, Tsang A, Tsantes S, et al: Breast reconstruction after mastectomy: A ten-year analysis of trends and immediate postoperative outcomes. Breast 32:7-12, 2016

32. Mills E, Eyawo O, Lockhart I, et al: Smoking cessation reduces postoperative complications: a systematic review and meta-analysis. Am J Med 124:144-154.e8, 2011

33. Schaverien MV, McCulley SJ: Effect of obesity on outcomes of free autologous breast reconstruction: a meta-analysis. Microsurgery 34:484-97, 2014

34. Davies K, Allan L, Roblin P, et al: Factors affecting post-operative complications following skin sparing mastectomy with immediate breast reconstruction. Breast 20:21-5, 2011

35. Woerdeman LA, Hage JJ, Hofland MM, et al: A prospective assessment of surgical risk factors in 400 cases of skin-sparing mastectomy and immediate breast reconstruction with implants to establish selection criteria. Plast Reconstr Surg 119:455-63, 2007

36. Negenborn VL, Dikmans REG, Bouman MB, et al: Predictors of complications after direct-to-implant breast reconstruction with an acellular dermal matrix from a multicentre randomized clinical trial. Br J Surg, 2018

37. Reuben BC, Manwaring J, Neumayer LA: Recent trends and predictors in immediate breast reconstruction after mastectomy in the United States. Am J Surg 198:237-43, 2009

38. Durrant CA, Khatib M, Macneill F, et al: Mastectomy and reconstruction in stage IV breast cancer: a survey of UK breast and plastic surgeons. Breast 20:373-9, 2011

39. Harmeling JX KC, Bijlard E, Burger KNJ, Jager A, Mureau MAM: The Effect of Immediate Breast Reconstruction on the Timing of Adjuvant Chemotherapy: a Systematic Review. 2015

40. Lam TC, Hsieh F, Boyages J: The effects of postmastectomy adjuvant radiotherapy on immediate two-stage prosthetic breast reconstruction: a systematic review. Plast Reconstr Surg 132:511-8, 2013

41. Netherlands Society for Plastic Surgery (NVPC). https://richtlijnendatabase.nl/en/richtlijn/breast_reconstruction/breast_reconstruction_after_mastectomy.html. [Accessibility verified September 14, 2017]

42. Schaverien MV, Macmillan RD, McCulley SJ: Is immediate autologous breast reconstruction with postoperative radiotherapy good practice?: a systematic review of the literature. J Plast Reconstr Aesthet Surg 66:1637-51, 2013