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# Chest wall perforator flap reconstruction in breast conserving surgery: quality of life and limited complications in outpatient treatment

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# Abstract

**Background** Breast conserving surgery (BCS) with partial breast reconstruction (PBR) results in less morbidity, better cosmetic outcomes, and improved patient satisfaction compared to mastectomy. Perforator flap reconstruction can attenuate defects prone to breast deformity after BCS. Usually, postoperative drains and inpatient admission are part of this treatment. The main objective of this study is to report on postoperative complications and patient satisfaction after drainless perforator flap reconstruction by a dedicated breast surgeon.

**Methods** In a retrospective case series, 42 patients were included. All patients underwent BCS with drainless perforator flap reconstruction, planned and performed by a single breast surgeon. Outcomes were complication incidence and patient satisfaction reported in the Breast-Q Breast Conserving Therapy (BCT) module.

**Results** In the study cohort, the median age was 59.5 (49.8–71.3) years. Tumour types were ductal carcinoma in situ (DCIS, four patients, 9.5%), invasive no special type (NST, 22 patients, 52.4%), invasive lobular (12 patients, 28.6%), and other invasive cancers (4 patients, 9.5%). Complication incidence was seven of 42 patients (16.7%), including hematoma, seroma, wound dehiscence, fat necrosis, and lymphedema, all Clavien Dindo grade 0–1, without readmission or reoperation. Reported Breast-Q scores (median of 17 months after surgery) were 87/100 for psychosocial well-being, 82/100 for breast satisfaction, and 71/100 for physical well-being. Outpatient treatment was successful in 38 patients (90.5%), and 13 patients (31.0%) had an unplanned visit to the outpatient clinic.

**Conclusion** Drainless perforator flap reconstruction performed by the breast surgeon results in high patient satisfaction and limited complications, both in number and severity. The use of drains and hospital stays after perforator flap reconstruction must be discouraged.

**Keywords** Breast conserving surgery, Partial breast reconstruction, Chest wall perforator flaps, Cosmetics, Quality of life, Outpatient treatment, Drainless breast surgery

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# Introduction

In Western Europe, approximately 30% of women diagnosed with breast cancer or ductal carcinoma in situ (DCIS) will undergo mastectomy [1]. Due to partial breast reconstruction (PBR) following breast conserving surgery (BCS), mastectomy can be avoided in patients with a high tumour-to-breast ratio, prone to deformity of the breast after BCS alone [2]. PBR results in favourable oncologic, surgical, and psychological outcomes [3-5]. Several techniques of PBR following BCS have been reported, dependent on excision volume and tumour location [2]. This study focuses on oncoplastic surgery of the breast with volume replacement [6]. Commonly used chest wall perforator flaps are the lateral intercostal artery perforator (LICAP, Fig. 1), the lateral thoracic artery perforator (LTAP), the thoracodorsal artery perforator (TDAP), the anterior intercostal artery perforator (AICAP), and the medial intercostal artery perforator (MICAP), For sake of clarity flaps can be classified as lateral (LICAP, LTAP, TDAP) or inframammary (AICAP, MICAP).

Postoperative complication rates are comparable for BCS with and without perforator flap reconstruction [5]. The most common complication following breast surgery is seroma, defined as an accumulation of serous fluid following surgery [5]. Postoperative closed-suction drains are often placed following BCS with perforator flap reconstruction, assuming that drains prevent the onset of seroma [7]. However, postoperative drains are associated with an increased risk of surgical site infections (SSI), an increased length of hospital stay, and patient discomfort [8]. Omitting drains in abdominal-based flap reconstructions, reduction mammoplasty, and mastectomy is safe without increasing seroma incidence [7, 9–11]. In most centers, inpatient treatment is still common practice for BCS with perforator flap reconstruction due to the use of postoperative drains and the more extensive dissection.

The literature lacks information regarding drains following BCS with perforator flap reconstruction and the feasibility of outpatient surgery. Moreover, quantifiable information regarding long-term patient satisfaction following perforator flap reconstruction is scarce.

This retrospective study aims to investigate the incidence and severity of complications, score patient satisfaction, and evaluate the feasibility of outpatient treatment in women undergoing drainless BCS with perforator flap reconstruction.

# Methods

# Study design

A retrospective case series was conducted in Canisius Wilhelmina Hospital (CWZ) in Nijmegen, The Netherlands. The study was approved by the local ethical committee of CWZ and complied with ethical and clinical regulations and guidelines. Due to the study's retrospective nature, informed consent from all patients was not required. Written informed consent has been obtained for the photographs.

## Participants

The study included all consecutive patients 18 years and older undergoing BCS with perforator flap reconstruction by a breast surgeon in CWZ breast centre (around 300 – 350 breast cancer diagnoses per year) from January 2019 to January 2023. There were no exclusion criteria as long as perforators could be identified by Doppler or ultrasound color-doppler.

#### Procedure

The patients included were treated by the same breast surgeon (LS). All patients underwent the best possible breast cancer treatment, with or without (neo)adjuvant therapy, based on national guidelines and in shared decision-making [12]. Depending on the size of the breast and the location of the tumour, one of the following perforator flap techniques was applied: lateral flap reconstruction (LICAP, LTAP, TDAP) or inframammary flap reconstruction (AICAP, MICAP). Perforator flap reconstruction could be offered as a one-stage or a two-stage approach, dependent on adequate oncological treatment.

### Data collection and definition

Data was extracted from the EPF (electronic patient file) and questionnaires. Data was stored in Microsoft Excel. Obtained baseline characteristics were based on assumed risk factors for wound complications after BCS [13–15]. Included were age, body mass index (BMI), cup size (A to G [16], polypharmacy (daily use of five or more medications as a proxy for comorbidity), smoking status, type of cancer (DCIS, invasive lobular carcinoma, invasive



Fig. 1 An example of BCS with lateral perforator flap reconstruction during surgery: the green arrow indicates the lateral thoracic artery

carcinoma No Special Type (NST), others), TNM 8 pathological classification, neo-adjuvant chemotherapy (NAC), adjuvant radiation therapy of the breast, type of surgery (direct or delayed reconstruction, with or without axillary lymph node dissection (ALND), type of flap reconstruction (lateral of inframammary perforator flap) and weight of resected tissue.

The primary outcome was complication incidence, which was scored six months postoperatively. Reported complications were seroma, non-aspirated seroma, surgical site infections (SSI), bleeding complications, wound healing complications (including wound dehiscence and wound necrosis), and lymph edema. Complications were reported whenever treatment or unplanned outpatient clinic visit(s) were needed. The Clavien Dindo Classification was used to classify the severity of the complication [17].

The secondary outcome was patient satisfaction, reported in the Breast-Q for Breast Conserving Therapy (BCT) module. Included modules were psychosocial well-being, physical well-being chest preoperative/postoperative, satisfaction with breast preoperative/postoperative, and satisfaction with the surgeon/medical team [18]. Scores from 0 to 100 were obtained for each module (the higher the score, the better the outcome). The Breast-Q for BCT was sent out to patients in February 2022 and again in June 2023 to patients who did not respond to the first questionnaire. Secondary outcomes regarding healthcare consumption were surgery time, duration of hospital stay, number of unplanned outpatient clinic visits, re-admission, and reoperation. The results of this study were compared to results reported in the literature.

# Statistical analysis

Using IBM SPSS Statistics 27, summary statistics were calculated for baseline characteristics. Continuous variables were presented as the median and interquartile range (IQR): 25th – 75th percentile. Categorical variables were presented as frequencies and percentages.

# Results

# **Baseline characteristics**

During the study, 42 consecutive patients were treated with BCS with perforator flap reconstruction. Three patients underwent an additional mastectomy due to tumour irradicality, and one patient underwent a mastectomy due to tumour recurrence. Table 1 overviews the patient, tumour, and treatment characteristics.

# Complications

Seven of 42 patients (16.7%) had a postoperative complication. A hematoma in three patients (7.1%) was the most common complication. Seroma was reported in one

Table 1	Baseline characteristics; patient, tumour, and treatment
characte	ristics

	N 42 Median (IQR: 25th – 75th per- centile), N (%)
Patient characteristics	
Age	59.5 (49.8–71.3)
BMI	23.0 (21.6-26.7)
Smoking status	5 (11.9)
Active	1 (2.4)
Passive	12 (28.6)
Quit	24 (57.1)
Never	
Polypharmacy	8 (19.0)
Cup size	7 (16.7)
A	13 (31.0)
В	14 (33.3)
C	6 (14.3)
D	2 (4.8)
E	
Tumour characteristics	
Type of cancer	4 (9.5)
DCIS	22 (52.4)
Invasive INST	12 (28.6)
Invasive lobular	4 (9.5)
	2 (4 0)
T (NIVI)	2 (4.8)
ТО	2 (4.6) 20 (47.6)
T1	20 (47.0) 16 (38.1)
T2	2 (4.8)
T3	- ( )
(T)N(M)*	31 (73.8)
NO	8 (19.0)
N1	1 (2.4)
N2	
Treatment characteristics	
Neoadjuvant therapy	10 (23.8)
Chemotherapy	4 (9.5)
Chemotherapy and immunotherapy	16 (38.1)
Hormone therapy	12 (28.6)
No	
Type of flap reconstruction	34 (81.0)
Lateral	8 (19.0)
Inframammary	
Reconstruction	31 (73.8)
Direct	11 (26.2)
Delayed	
Time to delayed reconstruction (days)	18 (16–28)
Resection specimen weight (g)	53 (37.8–96.0)
Postoperative drain	1 (2.4)
R	37 (88.1)
RO	5 (11.9)
R1	0 (0.0)
R7	

### Table 1 (continued)

	N 42 Median (IQR: 25th – 75th per- centile), N (%)
Adjuvant therapy**	40 (95.2)
Radiation therapy	4 (9.5)
Chemotherapy	24 (57.1)
Hormone therapy	1 (2.4)
Immunotherapy No	1 (2.4)
Secondary mastectomy	4 (9.5)

Variables are presented as median (IQR: 25th – 75th percentile), or frequency (%) BMI, Body Mass Index; DCIS, Ductal Carcinoma In Situ; NST, No Special Type

\*Sentinel node was not performed in 2 patients

\*\*The number of patients is not equal to 42 due to combined adjuvant treatments

patient (2.4%), wound dehiscence in two patients (4.8%), fat necrosis in one patient (2.4%), and lymphedema in two patients (4.8%). Two complications needed treatment and were scored as Clavien Dindo, grade 1. One patient required a seroma aspiration, and another patient needed Vacuum Assisted Closure therapy because of wound dehiscence (Table 2). No complications met the criteria of Clavien Dindo grade 2, 3, or 4.

#### Health care consumption

The median duration of surgery was 99 (78.5–153.3) minutes. Outpatient treatment was successful in 38 patients (90.5%). One patient was planned as an inpatient, being a patient preference. Three patients stayed for the night due to pain, nausea, and drowsiness. Thirteen patients (31.0%) had an unplanned visit to the outpatient clinic due to complications (4 patients), pain (4 patients), or worries about the wound (5 patients, Table 2). There was no readmission nor reoperation.

#### Patient-reported outcomes

Thirty patients (71.4%) completed the Breast-Q BCT, with a median of 17 (14–24.5) months after surgery. Psychosocial well-being was scored 87/100. Satisfaction with breasts was scored 71/100 preoperative and 82/100 post-operative. Physical well-being preoperative was scored 76/100 and postoperative 71/100. Satisfaction with the surgeon was 100/100, and satisfaction with the medical team was 100/100. Post-operative pictures of different perforator flaps are shown in Fig. 2.

Logistic regression analysis showed that postoperative complications were not significantly associated with psychosocial well-being, postoperative satisfaction with breasts, and postoperative physical well-being chest.

# Discussion

This retrospective case series reported the complication incidence in women undergoing drainless BCS with perforator flap reconstruction performed by a dedicated breast surgeon. Seven of 42 patients (16.7%) had a complication, and two (4.8%) needed non-operative treatment. Patient satisfaction measured by the Breast-Q BCT was high, and outpatient treatment was feasible in 90.5% of patients.

Reported complication incidences following BCS with perforator flap reconstruction are comparable to those of BCS alone. Most reported complications in the literature are SSI (3-5-5.0%), seroma (3-15%), hematoma (3-5%), wound dehiscence (3-15%), skin necrosis (1-24%), fat necrosis (1-12%) and lymphedema (5-6%) [5, 19-22]. In line with these, the present study reported a low total complication incidence (16.7%) [19, 20]. Comparing the current data with a previous study conducted at CWZ, which assessed the complication incidence in patients with BCS without reconstruction, the incidence rates are comparable. Excluding lymphedema, the incidence of wound complications in the current study drops to 11.9% (5 out of 42 patients). The previous study conducted at CWZ reported an incidence of 10.3-11.9% for BCS without reconstruction [23]. Remarkable in the present study was the absence of SSI and skin necrosis. Comparing the current study to a large multicentre study conducted by Karakatsanis et al., the incidence of complications in the current cohort was higher (16.7% versus 8.6%). However, the complications were generally less severe according to the Clavien Dindo classification [24]. Treatment for postoperative complications (Clavien Dindo grade  $\geq 1$ ) was necessary for two of 42 patients (4.8%) in the current study compared to 52 of 603 patients (8.6%) in the study of Karakatsanis et al. The absence of reoperations related to complications after primary surgery is notably lower than the reported 3% incidence documented in the literature [19, 20, 24, 25]. Forty patients (95.2%) in this study cohort received adjuvant radiation therapy. Subsequent low incidences of fat necrosis and breast edema confirm that intended radiation therapy should not preclude the use of perforator flap reconstruction.

In this series, drains were omitted, not resulting in increased seroma, hematoma, or other postoperative complications compared to incidences reported in the literature [5, 20, 22]. Thus confirming the safety of drainless BCS with perforator flap reconstruction [7]. Omitting postoperative drains opens, in some situations, the way to acceptance of outpatient surgery. Feasibility of breast surgery in outpatient care has been demonstrated earlier [26–28]. However, outpatient treatment in BCS with perforator flap reconstruction is still not common practice despite some studies reporting on outpatient treatment [24, 29]. In the present study, outpatient treatment

 Table 2
 Wound complications and health care consumption after drainless BCS with PBR

Complications	N 42	
	N (%)	
Complication	1 (2.4)	
Seroma	3 (7.1)	
Hematoma	2 (4.8)	
Wound dehiscence	1 (2.4)	
Fat necrosis	2 (4.8)	
Lymph edema		
Outpatient treatment	38 (90.5)	
Unplanned outpatient clinic visits	13 (31.0)	

Variables are presented as frequency (%)

is feasible in 90.5% of the patients after BCS with perforator flap reconstruction. The conversion rate from outpatient to inpatient admission, ranging from 0 to 14% in the literature, aligns with the findings of this study [30]. Furthermore, the reasons for inpatient admission (pain, nausea, or drowsiness) were comparable to those previously reported [30]. To our knowledge, no studies have reported unplanned visits to the outpatient clinic after BCS with or without perforator flap reconstruction. Reported results regarding unplanned visits to the outpatient clinic after mastectomy are in line with the obtained data in this series [31]. This shows that drainless BCS with perforator flap reconstruction is feasible and safe in the outpatient clinic.

Breast-Q scores after different types of oncoplastic breast surgery have been reported before, ranging from 69 to 85 for physical well-being, 81 to 91 for psychosocial well-being, and 74 to 80 for satisfaction with breasts [32, 33]. Ritter et al. reported higher patient satisfaction on the Breast-Q BCT modules satisfaction with breasts, psychosocial well-being, and sexual well-being after oncoplastic surgery compared to healthy women who did not undergo surgery [32]. The Breat-Q scores (satisfaction with breasts and psychosocial well-being) in the current study were slightly higher than those reported by Muktar et al. in patients undergoing BCS with perforator flap reconstruction, likely due to the more extended followup period in our study (follow-up of Muktar et al. was less than six months [29]. Zeeshan et al. reported a (significantly higher) satisfaction with breasts score of 100 after BCS with perforator flap reconstruction, which they attributed to cultural practices in their Pakistani cohort, such as covering the breasts with loose clothing to conceal scars and a regional tendency for surgeons to prefer mastectomy over breast conservation, thereby increasing



Fig. 2 Three postoperative examples of BCS with perforator flap reconstruction; a right breast LTAP, left breast BCT without reconstruction, b LTAP combined with LICAP, c AICAP

satisfaction when conservation is performed [34]. In the present study, patients did not report worse on the modules satisfaction with breasts and physical well-being postoperative compared to preoperative, illustrating a good to excellent performance of the more extensive BCS using perforator flap reconstruction.

A substantial proportion of the patients in the cohort (47%) had T1 tumours, including re-excisions following margin-positive DCIS, imaging-defined larger lobular cancers (where defining appropriate surgical margins preoperatively is often challenging), tumours that were part of a larger DCIS field as determined by MRI, and finally tumours resected after preoperative systemic treatment, which downsized the tumour to ypT1, while a larger resection volume was considered necessary. The eligibility for perforator flap surgery depends on the ratio between tumour and breast size. In patients with smaller breasts, this approach can prevent mastectomy, even for patients with T1 disease.

Limitations of this study are the relatively low number of treated patients and the varied range of perforator pedicles used. Although a consecutive series is described, the retrospective nature implies a risk of recall bias due to incomplete or inaccurate records in the electronic patient record and selection bias since patients included in the study might not be representative of the broader population. The generalizability of the results is limited due to the procedures performed by the same breast surgeon so that outcomes could reflect individual skills rather than generalizable results. The Breast-Q was sent to all patients simultaneously, resulting in measurements at different postoperative intervals. Furthermore, the questionnaire featured questions regarding pre- and postoperative satisfaction with breasts and physical wellbeing, which were both filled in postoperatively.

The strengths of this study are the consecutive series reflecting real-life situations and the patient-reported long-term outcome evaluation using the Breast-Q. Moreover, this is one of the first studies describing drainless perforator flap reconstruction, which results in the feasibility of outpatient treatment and reduces healthcare consumption. Besides, follow-up of more than one year makes it possible to reflect on mid- to longer-term effects and outcomes.

## Conclusion

BCS with perforator flap reconstruction provides breast surgeons and patients with an attractive tool to reduce mastectomy rates in selected patients. Drainless BCS with perforator flap reconstruction is feasible in outpatient care, with low complication rates and high patient satisfaction. Perforator flap reconstruction after BCS should be considered in future clinical practice of breast surgeons; however, more extensive studies are required for in-depth (statistical) analysis of complication rates, long-term follow-up, and patient-reported outcomes using the Breast-Q.

#### Abbreviations

BCS	Breast conserving surgery
PBR	Partial breast reconstruction
BCT	Breast conserving therapy
DCIS	Ductal carcinoma in situ
LICAP	Lateral intercostal artery perforator
AICAP	Anterior intercostal artery perforator
MICAP	Medial intercostal artery perforator
LTAP	Lateral thoracic artery perforator
TDAP	Thoracodorsal artery perforator
SSI	Surgical site infection
CWZ	Canisius Wilhelmina Hospital
EPF	Electronic patient file
BMI	Body mass index
NST	No special type
NAC	Neo-adjuvant chemotherapy
ALND	Axillary lymph node dissection

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#### not applicable.

#### Author contributions

Study concepts LS. Study design LS. Data acquisition LZ, RS, LS. Quality control of data and algorithms LZ, RS. Data analysis and interpretation LZ, RS. Statistical analysis LZ, RS. Manuscript preparation LZ, RS. Manuscript editing LZ, RS, RE, DU, JW, LS. Manuscript review LZ, RS, RE, DU, JW, LS.

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#### Data availability

No datasets were generated or analysed during the current study.

#### Declarations

#### Ethics approval and consent to participate

The study was approved by the local ethical committee of CWZ and complied with ethical and clinical regulations. Due to the study's retrospective nature, informed consent was not required.

#### **Consent for publication**

Consent for publication was obtained and made available from the corresponding author upon reasonable request.

#### Competing interests

The authors declare no competing interests.

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