Original Article

Surgical outcomes and complications: a study comparing oncoplastic surgery and lumpectomy

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Background: It is widely discussed whether oncoplastic surgery (OPS) and lumpectomies are comparable regarding surgical outcomes and complications. This study evaluates the quality of the surgical treatment of breast cancer (BC) patients, who underwent breast-conserving surgery (BCS) with or without oncoplastic techniques.

Methods: From September 1st, 2020 until December 31st, 2021, 130 patients were included in a retrospective, observational, single institution quality assurance study. Inclusion criteria were BC patients, who either underwent OPS or lumpectomy. The patients were evenly distributed in two groups (n=65) and matched on age and/or surgeon and/or date of operation. Variables included patient and tumour characteristics, surgical details and techniques, and complications. Statistical analysis was performed in R Studio.

Results: Demographics, tumour histology and use of neoadjuvant therapy were homogenous between the two groups. Tumours were significantly larger in the OPS group (25.00 *vs.* 15.00 mm, P<0.001) and significantly more multifocal (P=0.002). The median operation time was significantly longer in the OPS group compared to the BCS group (140 *vs.* 73 minutes, P<0.001). Regarding complication rates and time to adjuvant therapy, no statistical differences were found [radiotherapy (RT): BCS =57.27 *vs.* OPS =58.40 days or chemotherapy (CT): BCS =46.14 *vs.* OPS =49.85 days].

Conclusions: The complication rate of oncoplastic treatment in this study is comparable to lumpectomy, despite the being higher on the reconstructive ladder. OPS does not prolong time to adjuvant therapy.

Keywords: Oncoplastic; surgery; lumpectomy; breast cancer (BC); breast

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Introduction

Breast cancer (BC) is the most frequent type of cancer among women, accounting for one in eight cancer diagnoses globally (1). Refined surgery techniques, screening modalities and adjuvant radiotherapy (RT) and chemotherapy (CT) have improved survival rates (2). Furthermore, a wider segment of patients can be offered breast-conserving surgery (BCS) (3). Since the introduction of the radical mastectomy by Halsted, BCS has evolved and aims to remove the BC with adequate surgical margins and preserve the cosmesis of the breast (3-6). Despite accurate oncological therapy and surgical resection, 20–40% of women treated with BCS have

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a poor or unsatisfactory cosmetic outcome (3-5,7-9). Nearly one-third of lumpectomies result in major deformities and asymmetries (3,4). A long-term survival besides good aesthetic outcome is expected which is why oncoplastic surgery (OPS) is contemplated, as it enables BCS and virtuous aesthetics. OPS is BCS with involvement of plastic surgical interventions. In 2010, Clough *et al.* presented an atlas and guideline for OPS for patient selection (10). They noted that OPS integrates plastic surgery techniques for immediate reshaping after wide excision for BC.

They also suggested that OPS could be divided into two levels based on excision volume and the complexity of the reshaping technique.

We used the definition of OPS from the Danish Breast Cancer Group (DBCG) (11), complying with the guidelines on oncological radicality (12). Indications for BCS are widened by OPS, allowing tumour removal in a breast with an unfavourable tumour location or undesirable tumour-to-breast volume (13,14). Furthermore, OPS permits larger-sized resections, which potentially reduces both the incidence of positive margins and postoperative re-excisions (3,13). OPS is for larger tumours and/or more advanced breast disease and thus, OPS often causes prolonged operation time and surgical complexity e.g., tissue manipulation, which could affect the incidence of postoperative complications compared to lumpectomies (15). There are conflicting reports on the incidence of complications in OPS (3,6,13,16-21). To assess the quality of the surgical BC treatment in this manner, this study was conducted.

It consolidates on definitions of health services, dictated by the World Health Organisation (WHO), the Danish Cooperative Group for Quality in the Health Sector (DSKS), the Danish Health Law and the Quality policy of Region Zealand (22-25). We present this article in accordance with the STROBE reporting checklist (https://abs.amegroups.com/article/view/10.21037/abs-23-69/rc).

Highlight box

Key findings

- This study found a high quality of oncoplastic surgery (OPS) with corresponding standards to the lumpectomies regarding surgical outcomes and complications.

What is known and what is new?

- Discrepancy is found in literature about complication rates in OPS. Few studies compare traditional breast-conserving surgery with OPS.
- No significant differences in complication rates and time to adjuvant therapy where found between the two groups. The present study thus adds that regarding to surgical safety, OPS is a safe alternative to traditional lumpectomy despite being higher on the reconstructive ladder.

What is the implication, and what should change now?

- OPS should be considered on a larger scale in the treatment of women with breast cancer. Inclusion of patient-reported outcomes (patient satisfaction and quality of life), as well as more studies are necessary to vary and validate the findings of this study.

Methods

Study design

A retrospective, single-centre, quality assurance study was conducted at the Department of Plastic and Breast Surgery, University Hospital Zealand, Roskilde, Denmark. The study compared the surgical outcomes regarding to complication rate for BC patients, who underwent BCS with or without oncoplastic techniques.

The standard of practice for lumpectomy in Denmark is to close the cavity and skin in several layers after the resection. Oncoplastic breast surgery by Danish standard is defined according to the DBCG as a breast-conserving operation where lumpectomy is combined with plastic surgery principles to recreate the shape of the breast and thereby achieve a better cosmetic result. There are three main methods (5).

Volume displacement (level I): redistribution of breast tissue in the immediate vicinity of the tumour cavity (glandular flap) and often accompanied by repositioning of the nipple. For example, round block or ketcher plasty.

Volume reduction (level II): lumpectomy, where additional breast tissue and skin are removed based on reduction plastic surgery to achieve a good aesthetic result.

Volume replacement (level III): filling the tumour cavity with tissue sourced from outside the breast. For example, latissimus dorsi flap, local perforator flaps, or fasciocutaneous flaps.

The weight of the resected tissue from patients undergoing BCS is not routinely noted by the pathologists.

Participants

The clinical records were examined from September 1st, 2020 until December 31st, 2021. Medical records with the keywords “oncoplasty” and “lumpectomy” were enrolled. Inclusion criteria for data extraction were women diagnosed with BC who underwent either OPS or BCS.

Table 1 OPS details

Variables	Volume displacement	Volume reduction	Volume replacement
Number	16	39	10
Focality (multifocal), n (%)	2 (12.5)	10 (25.6)	2 (20.0)
Tumour size (mm), median (IQR)	19.00 (14.50, 23.25)	29.00 (19.50, 40.00)	22.50 (15.75, 40.00)
Technique (volume displacement), n (%)			
Batwing mastopexy	2 (12.5)		
J-type mammoplasty	3 (18.8)		
Lateral tennis racquet mammoplasty	3 (18.8)		
Round-block mastopexy	8 (50.0)		
Technique (volume reduction), n (%)			
Hall-Findley		17 (43.6)	
Lejour mammoplasty		3 (7.7)	
V mammoplasty		3 (7.7)	
Wise pattern		16 (41.0)	
Other		1 (2.6)	
Technique (volume replacement), n (%)			
AICAP			2 (20.0)
LICAP			7 (70.0)
TDAP			1 (10.0)

OPS, oncoplastic surgery; IQR, interquartile range; AICAP, anterior intercostal artery perforator flap; LICAP, lateral intercostal artery perforator flap; TDAP, thoracadorsal artery perforator flap.

Exclusion criteria were patients who declined participation in quality and patient security work and mastectomies including BCS converted to mastectomy. Subjects were stratified into two groups: OPS and BCS. A total of 136 eligible patients were identified, 130 patients in the OPS group (n=65) or BCS group (n=65). Six patients were excluded due to an incorrectly registered indication or later mastectomies. The surgeries were performed by 10 different breast and plastic surgeons. To ensure consistency, patients were matched on age and/or surgeon and/or date of operation.

Patient, pathologic, and surgical demographics

The variables included baseline data: age, body mass index (BMI), comorbidities, medicaments, menopausal status, alcohol, and smoking habits. The tumour characteristics obtained from the pathological and clinical examination were tumour size and focality, histological type, and sentinel lymph node (SN) status.

Surgical particulars included: neoadjuvant CT (NACT), type of surgery (OPS *vs.* lumpectomy), surgical technique, the weight of the resected surgical specimen, margin status, use of antibiotics and/or surgical drain, simultaneous contralateral symmetrizing surgery, axillary surgery [SN or axillary lymph node dissection (ALND)], and operative time. OPS was categorized into three groups: encompassing volume displacement, volume reduction, and volume replacement. ALND was conducted in case of preoperative positive fine needle aspiration or core biopsy from an axillary lymph node, or as standard procedure if macrometastases were detected in the SN (11).

Histopathological microscopic free margins were defined as >2 mm for ductal carcinoma *in situ* (DCIS), and no tumour on ink for invasive carcinomas (26). The OPS techniques are presented in *Table 1*.

Types of complications included: hematoma, seroma, infection, wound dehiscence, epidermolysis, skin necrosis and nipple-areola complex (NAC) necrosis. The duration of seroma was defined as the number of days from the first

aspiration of seroma liquid to the last aspiration. Aspiration volumes were registered as total volume in millilitres. Information regarding the need for re-excision or re-operation, time to adjuvant CT or RT including potential reasons for delay, and cancer recurrence were noted. Regarding perioperative use of antibiotics, in Denmark, there are no guidelines or consensus on this matter.

Data source, statistics, and ethics

Electronic medical records were reviewed in Sundhedsplatformen (Epic). Data were analysed in Research Electronic Data Capture tools (REDCap®).

Quantitative data were compared using the chi-square test and Fisher's exact test for categorical variables, and continuous variables were analysed with the Kruskal-Wallis test to determine differences in the medians. Univariate analyses described individual variables. Statistical tests were two-tailed and a P value of 5% ($P \leq 0.05$) was considered statistically significant. All analysis was performed in R Studio version R-4.2.0. for Windows.

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the institutional committee of Quality Assurance in the University Hospital of Roskilde, Roskilde, Denmark (No. 10296906), and individual consent for this retrospective analysis was waived.

Results

Data related to demographics are shown in *Table 2*. The groups were comparable in matter of age, comorbidity, tumour histology, BMI, and use of alcohol. Ultrasound measured tumour size was significantly larger in the OPS group {25.00 [interquartile range (IQR): 16.00, 40.00] *vs.* 15.00 (IQR: 10.00, 20.00) mm, P<0.001}. Significantly more in the OPS group had multifocal tumours (P=0.002). Administration of neoadjuvant therapy in the two groups was equally distributed.

Surgery type and details

Table 3 summarises surgical details. Two patients in the OPS group had bilateral cancers, the residual patients had unilateral cancers (n=132). The oncoplastic techniques used in the OPS group were tissue displacement (24.6%), volume reduction (60.0%) and tissue replacement (15.4%); subtypes and incision techniques are presented in *Table 1*. In total, 29.2% of the OPS patients (46.2% in the reduction subgroup, 6.8% in the displacement subgroup) received concomitant symmetrisation on the contralateral breast, with a similar surgical technique like the one used on the cancerous breast. The median lumpectomy weight resected was 203.00 g in the OPS group (IQR: 92.00, 497.00 g). No specimen weights were registered in the BCS group. SN was resected in the (majority) of both groups (BCS =84.6% *vs.* OPS =70.8%), whereas significantly more in the OPS group underwent ALND compared to the BCS group (27.7% *vs.* 13.8%). All patients were offered either SN resection or ALND, based on the lymph node staging. Data on pathological lymph node status are summarized in *Table 2*. Tranexamic acid and surgical drainage were more frequently used in the OPS group, and significantly more perioperative antibiotics were given in this group as well (53.8% *vs.* 4.6%, P<0.001). OPS techniques were significantly more time-consuming compared to BCS procedures, with a median of 122.00 compared to 73.00 minutes (P<0.001).

Complications and adjuvant therapy

Types of postoperative complications in both groups are summarised in *Table 4*. Regarding to re-excision acquiring free margins, there was no significant difference (BCS =12.3% *vs.* OPS =10.8%, P>0.99; *Table 3*). No disparity was found related to reoperation owing to complications (BCS =4.6% *vs.* OPS =2.3%). The incidence, duration, and average volume of seromas were homogenous between the groups. Major hematomas requiring surgical intervention were only seen in the OPS group (1.2%).

The incidence of conservatively treated wound dehiscence in the OPS group was considerable (in total: 10.5% *vs.* 3.1%). However, wound dehiscence in need of surgical treatment was equally divided between the two groups (OPS =3.5% *vs.* BCS =4.6%). Both groups had equivalent infection rates with BCS =6.2% *vs.* OPS =5.8%. All cases of skin necrosis were minor and treated in the outpatient clinic. Nor epidermolysis or NAC necrosis was registered.

No difference in time to first given adjuvant therapy were found between the groups, regarding RT (BCS =57.27 *vs.* OPS =58.40 days) or CT (BCS =46.14 *vs.* OPS =49.85 days). All patients who received CT were treated with RT afterwards as standard. Twelve BCS and eight OPS patients experienced a delay in their adjuvant treatment mostly due to practical circumstances. One

Table 2 Patient and tumour characteristics

Variables	BCS	OPS	P
Number	65	65	–
Age (years), mean (SD)	57.82 (9.11)	58.09 (10.39)	0.872
Weight (kg), mean (SD)	75.32 (14.94)	77.20 (15.51)	0.483
Height (cm), mean (SD)	166.54 (5.91)	166.46 (7.17)	0.947
BMI (kg/m^2), median (IQR)	25.40 (23.30, 31.20)	26.50 (23.90, 31.20)	0.476
Use of alcohol, n (%)			0.802
Nihil	27 (41.5)	30 (46.2)	
1–7 units	25 (38.5)	25 (38.5)	
8–14 units	4 (6.2)	1 (1.5)	
15+ units	1 (1.5)	1 (1.5)	
Undisclosed	8 (12.3)	8 (12.3)	
Smoking status, n (%)			0.311
Nihil	27 (41.5)	36 (55.4)	
Smoker	12 (18.5)	6 (9.2)	
Former smoker	18 (27.7)	17 (26.2)	
Undisclosed	8 (12.3)	6 (9.2)	
Gynaecological status, premenopausal, n (%)	21 (32.3)	20 (30.8)	>0.99
Comorbidities, n (%)			
Autoimmune disease	8 (12.3)	9 (13.8)	>0.99
Hypertension	14 (21.5)	15 (23.1)	>0.99
Cardiovascular disease	10 (15.4)	10 (15.4)	>0.99
Diabetes	5 (7.7)	3 (4.6)	0.718
Metabolic disease	5 (7.7)	11 (16.9)	0.181
Previous cancer, other than skin cancer	4 (6.2)	5 (7.7)	>0.99
Blood-thinners, n (%)	2 (3.1)	4 (6.2)	0.680
Tumour size (mm), median (IQR)	15.00 (10.00, 20.00)	25.00 (16.00, 40.00)	<0.001*
Focality (multifocal), n (%)	2 (3.1)	14 (21.5)	0.002*
Histopathology, n (%)			0.447
Invasive ductal carcinoma	53 (81.5)	47 (72.3)	
Invasive lobular carcinoma	4 (6.2)	6 (9.2)	
DCIS	5 (7.7)	10 (15.4)	
Others	3 (4.6)	2 (3.1)	
Lymph node status†, n (%)			0.184
SN without pathology	51 (79.7)	44 (68.8)	
Micrometastasis	6 (9.4)	5 (7.8)	
Macrometastasis	7 (10.9)	15 (23.4)	
NACT (yes), n (%)	16 (24.6)	16 (24.6)	>0.99

*, statistically significant; †, one patient in each group has declined axillary surgery. BCS, breast-conserving surgery; OPS, oncoplastic surgery; SD, standard deviation; BMI, body mass index; IQR, interquartile range; DCIS, ductal carcinoma in situ; SN, sentinel node; NACT, neoadjuvant chemotherapy.

Table 3 Surgical details

Variables	BCS	OPS	P
Number	65	65	–
Laterality, n (%)			0.119
Bilateral	0 (0.0)	2 (3.1)	
Right	30 (46.2)	37 (56.9)	
Left	35 (53.8)	26 (40.0)	
Preoperative antibiotics (yes), n (%)	3 (4.6)	35 (53.8)	<0.001*
Tranexamic acid (yes), n (%)	0 (0.0)	3 (4.6)	0.244
Axillary surgery, n (%)			0.019*
SN	55 (84.6)	46 (70.8)	
ALND	9 (13.8)	18 (27.7)	
Axillary surgery declined	1 (1.5)	1 (1.5)	
Specimen weight (g), median (IQR)	NA	203.00 (92.00, 497.00)	NA
Surgical drains applied, n (%)	1 (1.5)	4 (6.2)	0.365
Re-excision (yes), n (%)	8 (12.3)	7 (10.8)	>0.99
Operation time (minutes), median (IQR)	73.00 (58.00, 90.00)	122.00† (91.00, 156.50)	<0.001*
Contralateral symmetrisation (yes), n (%)	0 (0.0)	19 (29.2)	<0.001*

*, statistically significant; †, calculated from the 46 patients not receiving contralateral symmetrisation. BCS, breast-conserving surgery; OPS, oncoplastic surgery; SN, sentinel node; ALND, axillary lymph node dissection; IQR, interquartile range; NA, not available.

patient in the OPS group had a recurrence and died.

Discussion

OPS has found increasing favour in the surgical BC treatment (3,13,17,20,21,27,28). In this retrospective, single-centre study, we compared risk of complications and time to adjuvant therapy in patients undergoing OPS (BCS with plastic surgical strategies) *vs.* patients undergoing BCS (BCS without plastic surgical strategies).

Patient and tumour characteristics

Despite an increased risk of wound healing and surgical site complications associated with smoking and elevated BMI (3,14). BC patients at our clinic were offered either OPS or BCS, and urged to pause smoking as well as blood thinners. Tumour size was significantly larger in the OPS group with a median of 25 mm. This confers with a large systematic review, including 55 studies with 6,011 OPS patients, epitomising a mean tumour size of 23 mm (19). The significant multifocal disease in the OPS group is supported by two similar case-matched studies, including a large group of patients by De Lorenzi *et al.* (29,30).

The SN pathology determines the extent of axillary surgery (5), hence the majority of BCS only had SN removed, while nearly 30% of OPS patients had ALND. As Romics and Campbell summarise tumour size, focality, and nodal status were found less favourable in the OPS cases compared to BCS (31).

Complications and outcomes

OPS techniques facilitate resection of larger tissue volumes, and tumour excision with wider margins, compared to BCS (7,13,18,20,21,27,28,32,33). However, importantly, further resection margins do not offer increased oncological safety.

The complexity of OPS is reflected in longer operative time (6,28,34) causing comprehensive tissue trauma, possibly accentuating the complication rate (35). Literature relates to OPS cohorts, with complication rates of 8.9–16.3% (19,31), compared to 24% in a BCS cohort alone (33). Nonetheless, the majority of studies report no difference

Table 4 Complications and adjuvant therapy

Variables	BCS	OPS	P
Number (breasts)	65	86	–
Reoperation due to complications, n (%)	3 (4.6)	2 (2.3)	0.652
Complications			
Seroma, n (%)			0.753
No	56 (86.2)	76 (88.4)	
Major seroma	9 (13.8)	10 (11.6)	
Duration (days), mean (SD)	4.29 (10.28)	4.58 (10.60)	0.867
Volume (mL), mean (SD)	88.62 (319.03)	94.06 (336.24)	0.920
Infection (yes), n (%)	4 (6.2)	5 (5.8)	0.930
Hematoma, n (%)			0.288
No	65 (100.0)	85 (98.9)	
Major hematoma	0 (0.0)	1 (1.2)	
Wound dehiscence, n (%)			0.220
No	60 (92.3)	74 (86.0)	
Conservatively treated	2 (3.1)	9 (10.5)	
Surgical intervention	3 (4.6)	3 (3.5)	
Epidermolysis (yes), n (%)	0 (0.0)	0 (0.0)	–
Skin necrosis, n (%)			0.760
No	63 (96.9)	84 (97.7)	
Minor, conservatively treated	2 (3.1)	2 (2.3)	
NAC necrosis	0 (0.0)	0 (0.0)	
Adjuvant therapy			
Number	65[†]	65[†]	–
Number (patients receiving CT before RT)	14	21	–
Time to CT (days), mean (SD)	46.14 (13.42)	49.85 (15.97)	0.483
Delayed treatment (yes), n (%)	2 (14.3)	3 (14.3)	–
Due to complications	0 (0.0)	0 (0.0)	
Patient's request	2 (100.0)	1 (33.3)	
Practical circumstances	0 (0.0)	2 (66.7)	
Patient receiving CT declining RT	1 (7.1)	1 (4.8)	–
Number (patients receiving only RT)	49	42	–
Time to RT (days), mean (SD)	57.27 (14.99)	58.40 (18.46)	0.749
Delayed treatment (yes), n (%)	14 (28.6)	11 (26.2)	0.816
Due to complications	2 (14.3)	2 (18.2)	
Patient's request	3 (21.4)	0 (0.0)	
Practical circumstances	9 (64.3)	9 (81.8)	

[†], two patients in each group chose against standard of care not to receive any adjuvant therapy. BCS, breast-conserving surgery; OPS, oncoplastic surgery; SD, standard deviation; NAC, nipple-areola complex; CT, chemotherapy; RT, radiotherapy.

in surgical complications, comparing BCS with OPS (3,6,17-19). Yet, some studies depict tendencies of non-healing wounds (13,17,18,20), infection (20,21), and liponecrosis (13,17,21) in the OPS group, compared to the BCS group (though without prolonging time to adjuvant therapy). In our study, no significant difference in complications rates were found even though one could hypothesise that the rate of seroma and necrosis would be more frequent in the OPS group due to the extensive tissue mobilisation, potential larger surgical dead space and more frequent ALND. In this study mild skin necrosis was observed. This correlates with previous reported rates of skin necrosis of 0.5% (18,19). The incidence of seromas in need of treatment were likewise found corresponding to the systematic review by Campbell *et al.* in OPS patients (13%) (18). Hematomas were equally expected to be more extensive in the OPS group, owing to the surgical proportions and more numerous ALND's. Nevertheless, our data did not support that assumption, which is supported in literature (2–2.5%) (6,17-19).

One criticism of OPS is the necessary symmetrisation of the contralateral breast. In this study, simultaneous contralateral symmetrisation was performed in 29.2% of the OPS patients; 46.2% of these were in the OPS reduction subgroup, which aligns with the findings by De Lorenzi *et al.* (55% in total) (29).

This study did not find any significant differences in complication rates within the OPS group or between the OPS and BCS groups. Complications are most frequently seen on the cancerous site (3,31), and symmetrisation is valued, concerning cosmesis and aesthetic outcome. According to literature, OPS patients are more satisfied with the cosmetic outcome compared to BCS (4,14,19,33,35) and patient dissatisfaction correlates with asymmetry and postoperative complications (33,36). This emphasises that the OPS techniques, including reduction mammoplasties, are prudent choices in surgical BC treatment.

There is no consensus as to the administration of antibiotics during breast surgery in Denmark. It is however worth mentioning that in a Cochrane review of 2,867 patients, Jones *et al.* found that preoperatively administered prophylactic antibiotics reduce the risk of surgical site infection in patients undergoing surgery for BC (37). Similarly, a meta-analysis conclude that preoperative antibiotics should routinely be given before breast reduction surgery (38).

Adjuvant therapy and oncological safety

Studies find that more extensive resections in OPS may decrease the incidence of positive margins (13,15,17,27,28,31,33,35,39-41) and reduce the number of re-excisions compared to BCS. However, re-excision rates between the two groups in this study were almost similar, with only a minor majority in the BSC group (12.3% *vs.* 8.1%), despite a greater resection weight in the OPS group. In the latter case, larger tumours and extensive multifocality might challenge the radical tumour resection, why tumour-free marginals are difficult to achieve. This is supported by other authors, who do not find significant oncological advantages regarding wider resections, or obviation of positive tumour margins (6,18,20).

The argument is substantiated in literature, by the lack of standardization concerning tumour margins (18) and the diversity in the OPS procedures (6,35). Yet, our data demonstrate acceptable rates of re-excisions in both groups, suggesting a tendency for a proper selection of patients, and consistent surgical treatments.

Re-excisions and complications may extend the interval between initial surgery and initiation of adjuvant therapy. Guidelines by DBCG ordinarily recommend a time interval of 3 to a maximum of 12 weeks until initiation of adjuvant RT, since delaying RT beyond 8 weeks has proved detrimental effects on local recurrence (18,42). In our study, time to adjuvant therapy was not delayed, or differentiated between the two groups, following the guidelines. This is corroborated by studies, demonstrating that OPS does not prolong the time to adjuvant therapy, whether it is RT or CT (6,14), (17,18,21,40,43), even in defiance of an increased rate of complications in the investigated OPS group (17,33,35).

Recent studies relate to long-term follow-up intervals of 5 and 10 years in OPS cohorts, with cumulative local recurrence rates of 2.2% and 3.2%, regional rates of 1.1% and 3.1%, and distant rates of 12.4% and 12.7% respectively (21,29). Compared to BCS, no statistical differences in any foci of recurrences were found in the studies (21,29). Follow-up were not noted in most cases in this study, due to a confined period of data-recording. Campbell *et al.* suggest that OPS should be compared to mastectomies as well, given the similarities between OPS and mastectomy patients' histopathology (18). Although this study excluded mastectomy patients, data obtained from the BCS and OPS groups were still comparable regarding both

tumour histology and complication rates. A prospective comparison between all three groups could give a more nuanced overview with particular reference to tumour size and multifocality. Besides, some authors argue that oncological safety is associated with factors inherent to the patient and tumour biology, more than the OPS techniques itself (18,19,31). Against this background and supported by numerous studies (13,14,17,19,27-31,33-35,44-46), OPS is believed to be oncological safe, and an equal alternative to BCS, regarding quality and surgical outcomes.

Strengths and limitations

Although this study included patients with matching demographics, surgeons/operative dates, and tumour pathology, a limitation is the stature of a single institution, retrospective study. Other limitations are the limited number of patients, deficient follow-up, and a lack of assessment of patient satisfaction and cosmetic outcomes. Seventy-five percent of recurrence occur within the first 5 years which is why a 5-year follow-up should be scheduled (18). In our clinic, patient-reported outcomes are assessed since September 2021 using BREAST-Q (47), including patient satisfaction and quality of life.

Conclusions

Nowadays almost every patient should receive defect coverage according to BCS with some OPS technique. However, in Denmark, not all women with BC receive OPS. We suggest that a larger fraction of these women should be offered OPS as it seems that OPS is an equitable therapeutic option compared to lumpectomies (BCS) in the surgical BC treatment. The tumour burden is heavier and more unfavourable in the OPS group compared to the BCS group. Furthermore, a tendency for more axillary dissections and significantly longer operation times occurs in the OPS group. However, no significant differences in complication rate were found between the two groups. Importantly, the time to adjuvant therapy was not delayed in the OPS group. The quality of the surgical treatment of BC patients treated with OPS or BCS is thus of equal high standards regarding to risk of complications.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at https://abs.amegroups.com/article/view/10.21037/abs-23-69/rc

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the institutional committee of Quality Assurance in the University Hospital of Roskilde, Denmark (No. 10296906), and individual consent for this retrospective analysis was waived.

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