

**ORIGINAL RESEARCH**

# Assessing surgical and oncological outcomes in breast cancer patients undergoing oncoplastic versus non oncoplastic breast-conserving surgery

<sup>1</sup>Dr. Apurva Agarwal, <sup>2</sup>Dr. Santsevi Prasad, <sup>3</sup>Dr. Sushant Kumar Sharma

<sup>1</sup>Specialist Medical Officer, Sub Divisional Hospital, Sitamarhi, Bihar, India

<sup>2</sup>Assistant Professor, <sup>3</sup>Professor, Department of Surgery, SKMC, Muzaffarpur, Bihar, India

**Corresponding Author**

Dr. Sushant Kumar Sharma

Professor, Department of Surgery, SKMC, Muzaffarpur, Bihar, India

Email: [dr.sushant@ymail.com](mailto:dr.sushant@ymail.com)

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**ABSTRACT**

**Introduction:** Recently, breast conserving surgery (BCS) followed by radiotherapy has been gaining popularity for most patients with early breast cancer; though, this technique has justified to be comparable with mastectomy in view of long-term survival in certain selected groups of women. This surgical option includes lumpectomy and sentinel node biopsy with or without radiotherapy and presents potential advantages over radical procedures as it is potentially less invasive, less debilitating and more aesthetically acceptable. Oncoplastic breast surgery (OBS) is a novel approach that developed greatly in the last decades that combines BCS with concomitant breast reconstruction. The aim of this technique is to get a safe and complete removal of the tumorous lesion while achieving the best possible aesthetic result. OBS consists of large lumpectomy and remodelling techniques such as breast-reshaping by therapeutic reduction mammoplasty or volume reduction by local glandular flaps or regional/distant flaps. Hence this study aimed at comparing the patients who had undergone non-oncoplastic and oncoplastic breast conserving surgery based on the tumour characteristics and its postoperative complications. Associated risk factors such as positive margins and local recurrence were also evaluated.

**Materials and Methodology:** This was a retrospective, observational, cohort study conducted on a group of patients treated for breast cancer for almost 2 years at the surgery department. Patients included were 18 years of age or older, female and had been treated with lumpectomy, either oncoplastic or non-oncoplastic. Patients were divided into two groups depending on the type of treatment received. Oncoplastic surgery included therapeutic mammoplasty and adjacent tissue transfer following lumpectomy and comprised in some cases a bilateral procedure. Therapeutic mammoplasty was performed in the case of breast hypertrophy (macromastia and gigantomastia) and superior, medial, or inferior pedicle mammoplasty. Each patient was then followed by a surgical team comprised of an oncological and a plastic surgeon. In the case of a bilateral procedure, one or two residents were also present to perform surgery on both sides at the same time. The option of the most appropriate procedure for each patient was made by the oncologist and the plastic surgeon depending on breast and tumour size and based on patient's general conditions. Patient's data were collected from existing patients' medical records, from the initial diagnosis to the last visit and included: demographics (age and body mass index [BMI]), tumour size, tumour margin status, patients requiring re-excision, patients at the verge of receiving post-operative radiotherapy, time interval between surgery and radiotherapy, complications and length of follow-up. Both immediate (infection, non-healing wounds, wound dehiscence, nipple necrosis, hematomas and seromas) and long-term (skin retraction and fat necrosis) complications were considered in the analysis. Complications were evaluated both by the plastic surgeon and an oncological surgeon. All data were analysed statistically. Primary analyses were conducted to compare patients based on breast conserving surgery type (i.e., non-oncoplastic vs. oncoplastic). Differences between the two groups were assessed by Chi-square test. A p-value of <0.05 was considered statistically significant. Statistical analysis was performed using SPSS software for Windows.

**Results:** 225 patients were included as study participants in the study. Four patients underwent bilateral lumpectomy because of bilateral cancer. Non-oncoplastic surgery was performed on 160 (72.3%) patients while 61 (27.6%) underwent an oncoplastic procedure; after lumpectomy patients were treated with post-operative radiation whenever necessary. Data related to patients' demographics, tumor details and follow-up are summarized in Table I. None of the patients presented with multicentric tumor and the median size of the lesion was not statistically different between the two groups:  $1.4 \pm 0.9$  vs.  $1.3 \pm 0.7$  (range 0.01-4;) for mammoplasty and oncoplastic surgery, respectively. The percentage of patients requiring re-excision was twice greater for women in the non-oncoplastic group: 12.9% vs. 6.5% in the oncoplastic group and the difference was statistically significant ( $p < 0.05$ ). However, the number of patients receiving post-operative radiation, the interval between surgery and radiotherapy and follow-up were similar between the two groups and the statistical analysis did

not show any significant difference. Median follow-up was 43.3±21.1 months in the non- oncoplastic group and 44.8±16.0 months in the oncoplastic group. Only one patient (0.6%) experienced local recurrence after non-oncoplastic surgery, while no one recurred after the oncoplastic procedure. The rate of complications was slightly higher in the oncoplastic group, where three patients (4.9%) reported complications after surgery, while in the non- oncoplastic group complications were observed only in 2 patients (1.3%). The main complications reported by patients were hematoma (80%), non-healing wound (60%), and infection (20%) and wound dehiscence (20%). Patients received the following treatments in case of seroma formation: elasto-compressive medications, suction drain and possible guided external drainage of collected serum. There was no difference in the post-operative treatment received by patients in the two groups. No long-term complications were registered in our study. **Conclusion:** From this study it has been concluded that the oncoplastic surgery can be proposed for patients with tumours with unfavourable characteristics for traditional breast conservation surgery. Although it is used for the treatment of larger and multifocal tumours and surgical re-excisions were less often performed and was not related to higher rates of conversion to mastectomy or increased risk of local recurrence. Even though the overall complications were higher in the oncoplastic group, the incidences of major complications were similar in both groups. It should be considered as a safe tool to expand the indications of breast conservation surgeries.

**Keywords:** breast neoplasm, oncoplastic surgery, breast conserving surgery, mastectomy.

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## INTRODUCTION

Recently, breast conserving surgery (BCS) followed by radiotherapy has been gaining popularity for most patients with early breast cancer; though, this technique has justified to be comparable with mastectomy in view of long-term survival in certain selected groups of women.<sup>1,2</sup> This surgical option includes lumpectomy and sentinel node biopsy with or without radiotherapy and presents potential advantages over radical procedures as it is potentially less invasive, less debilitating and more aesthetically acceptable.<sup>3,4</sup>

Even though, the marked improvement proved by BCS, the aesthetic outcome is often not at par to obtain a complete excision of the tumour<sup>5</sup> and poor cosmetic results have been reported in 25-30% of patients.<sup>6,7</sup> The major factors that may have direct impact on the aesthetic result are tumour-to-breast volume and tumour location. A 10% from the total volume excision is usually considered as an aesthetically acceptable norm for BCS; however, due to the relative tissue paucity, medial reduction of more than 5% will lead to poor aesthetic results, whereas it is possible to achieve a positive outcome when 15% of the breast volume is removed laterally.<sup>8</sup> In addition, mastectomy is conventionally preferred in patients at higher risk of local recurrence.<sup>9</sup> Since breast cancer remains the most common cancer among women in the Western population and its survival rates have consistently been increased over the last decades due to spreading of screening campaigns, combined with improvements in radiotherapy, hormone therapy and chemotherapy.<sup>10</sup> In addition, the wide availability of neo- adjuvant chemotherapy has made many patients to fit for BCS rather than conventional mastectomy.<sup>11</sup> As a result, the importance of cosmetic practice has substantially increased, and patients' expectations and demands have become higher.

Oncoplastic breast surgery (OBS) is a novel approach that developed greatly in the last decades that combines BCS with concomitant breast reconstruction. The aim of this technique is to get a

safe and complete removal of the tumorous lesion while achieving the best possible aesthetic result.<sup>12,13</sup> OBS consists of large lumpectomy and remodelling techniques such as breast-reshaping by therapeutic reduction mammoplasty or volume reduction by local glandular flaps or regional/distant flaps. A wide range of surgical procedures of different complexity characterizes OBS, which frequently includes contralateral surgery to obtain breast symmetrisation, like in the case of very large breasts.<sup>14,15</sup> Though there are benefits associated with oncoplastic surgery, some researchers have identified a higher frequency of postoperative complications as wound dehiscence and flap necrosis than of non-oncoplastic breast conservation surgery.<sup>16</sup> However, most of these studies assessed heterogeneous populations as patients which were not stratified in accordance with the type of oncoplastic surgery performed and the classification of postoperative complications was not standardized at all.<sup>17</sup>

Hence this study aimed at comparing the patients who had undergone non-oncoplastic and oncoplastic breast conserving surgery based on the tumour characteristics and its postoperative complications. Associated risk factors such as positive margins and local recurrence were also evaluated.

## MATERIALS AND METHODOLOGY

This was a retrospective, observational, cohort study conducted on a group of patients treated for breast cancer for almost 2 years at the surgery department. Patients included were 18 years of age or older, female and had been treated with lumpectomy, either oncoplastic or non-oncoplastic. Patients were divided into two groups depending on the type of treatment received. Oncoplastic surgery included therapeutic mammoplasty and adjacent tissue transfer following lumpectomy and comprised in some cases a bilateral procedure. Therapeutic mammoplasty was performed in the case of breast hypertrophy (macromastia and gigantomastia) and superior, medial, or inferior pedicle mammoplasty. Each patient was then followed by a surgical team comprised of an oncological and a

plastic surgeon. In the case of a bilateral procedure, one or two residents were also present to perform surgery on both sides at the same time.

The option of the most appropriate procedure for each patient was made by the oncologist and the plastic surgeon depending on breast and tumour size and based on patient's general conditions. Patient's data were collected from existing patients' medical records, from the initial diagnosis to the last visit and included: demographics (age and body mass index

[BMI]), tumour size, tumour margin status, patients requiring re-excision, patients at the verge of receiving post-operative radiotherapy, time interval between surgery and radiotherapy, complications and length of follow-up. Both immediate (infection, non-healing wounds, wound dehiscence, nipple necrosis, hematomas and seromas) and long-term (skin retraction and fat necrosis) complications were considered in the analysis. Complications were evaluated both by the plastic surgeon and an oncological surgeon.

All data were analysed statistically. Primary analyses were conducted to compare patients based on breast conserving surgery type (i.e., non-oncoplastic vs. oncoplastic). Differences between the two groups were assessed by Chi-square test. A p-value of <0.05 was considered statistically significant. Statistical analysis was performed using SPSS software for Windows.

## RESULTS

225 patients were included as study participants in the study. Four patients underwent bilateral lumpectomy because of bilateral cancer. Non-oncoplastic surgery was performed on

160 (72.3%) patients while 61 (27.6%) underwent an

oncoplastic procedure; after lumpectomy patients were treated with post-operative radiation whenever necessary. Data related to patients' demographics, tumor details and follow-up are summarized in Table I. None of the patients presented with multicentric tumor and the median size of the lesion was not statistically different between the two groups:  $1.4 \pm 0.9$  vs.  $1.3 \pm 0.7$  (range 0.01-4;) for mammoplasty and oncoplastic surgery, respectively. The percentage of patients requiring re-excision was twice greater for women in the non-oncoplastic group: 12.9% vs. 6.5% in the oncoplastic group and the difference was statistically significant ( $p < 0.05$ ). However, the number of patients receiving post-operative radiation, the interval between surgery and radiotherapy and follow-up were similar between the two groups and the statistical analysis did not show any significant difference. Median follow-up was  $43.3 \pm 21.1$  months in the non-oncoplastic group and  $44.8 \pm 16.0$  months in the oncoplastic group. Only one patient (0.6%) experienced local recurrence after non-oncoplastic surgery, while no one recurred after the oncoplastic procedure. The rate of complications was slightly higher in the oncoplastic group, where three patients (4.9%) reported complications after surgery, while in the non-oncoplastic group complications were observed only in 2 patients (1.3%). The main complications reported by patients were hematoma (80%), non-healing wound (60%), and infection (20%) and wound dehiscence (20%). Patients received the following treatments in case of seroma formation: elasto-compressive medications, suction drain and possible guided external drainage of collected serum. There was no difference in the post-operative treatment received by patients in the two groups. No long-term complications were registered in our study.

**Table I. Patients' demographics, tumour details and follow-up after non-oncoplastic vs oncoplastic breast surgery.**

Parameters	Non – oncoplastic group			Oncoplastic group			P -value
	No.	Result	Range	No.	Result	Range	
Age (years)	160	$63.6 \pm 12.3$	29-88	61	$53.9 \pm 12.6$	26-80	0.053
Body mass index (BMI)	160	$32.8 \pm 8.6$	18.3-67.5	61	$30.3 \pm 7.3$	17.6-51.9	0.439
Re-excision	160	20(12.9%)	-	61	4 (6.5%)	-	<0.05
Tumour size (cm)	160	$1.9 \pm 0.9$	0.3-5.1	61	$1.5 \pm 0.7$	0.01 -4.0	0.389
Post – operative radiotherapy	160	117 (76%)	-	61	45(73.8%)	-	0.499
Time interval (in months)	99	$4.2 \pm 2.9$	1-12	37	$5.4 \pm 3.1$	1-11	0.329
Follow – up (months)	160	$43.6 \pm 21.4$	190-107	61	$44.9 \pm 16.2$	17-101	0.688
Local recurrence	160	1 (0.6%)	-	61	0	-	-
Complications	-	2 (1.3%)	-	61	3 (4.9)	-	0.221

## DISCUSSION

Breast oncoplastic surgery looks to offer same results to BCS in respect to safety and oncological outcomes, in patients where conservative surgery is indicated to patients. The main advantage of oncoplastic techniques seems to be the possibility of performing wider excisions without getting compromised in the aesthetic outcomes with the possibility of reducing the

risk of positive margins. In our research, only 4 patients required re-excision after oncoplastic surgery (6.5%) while reoperation was performed on 20 women (12.9%) in the non-oncoplastic group. These results are in concordance with the literature data available on oncoplastic surgery that reported a number of patients requiring re-excision after lumpectomy ranging from 8% to 20%.<sup>17,18-20</sup> Though,

the study by *Kaur et al*<sup>21</sup> it was reported that after oncoplastic surgery 83.4% of the patients presented with negative margins, compared to 56.7% in case of quadrantectomy; although re-excision rates were not reported in this study, we can assume that these were smaller in the oncoplastic group. Since the decreased need for reoperation after OBS, it is important to note that re-excision procedures in case of positive margins might be compromised in oncoplastic surgery owing to the extensive parenchymal re-contouring and the possibility of leaving some margins widely apart.<sup>22</sup> Patients at the side of receiving post-operative radiotherapy might get affected from moderate to severe adverse reactions like mastitis, vasculitis, breast parenchyma fibrosis and chronic pain.<sup>23</sup> notably, these side effects seem to be related directly to the amount of breast tissue that has been irradiated. Reduction mammoplasty might help in decreasing the risk of adverse effects and increase the homogeneity of the therapy by reduction in breast volume.<sup>23</sup> Also, some amount of shrinkage might occur after radiotherapy, the bilateral approach being used in OBS might help to reduce the breast asymmetry and maintain a good aesthetic outcome comparably.<sup>24</sup> Our data showed significant little difference in the number of patients requiring post-operative radiotherapy after non-oncoplastic or oncoplastic treatment. Most importantly, there was no marked difference in the time interval between surgery and radiotherapy in the two groups, thus suggesting that OBS will not prolong the time for radiation therapy.

In this study, we obtained only 1 local recurrence in the non-oncoplastic group, while nocal recurrences were reported in patients treated with OBS. Our results are in symmetry with those previously resulted in other studies on OBS.<sup>25,26</sup> and are fully comparable to the study performed by *Tenofsky et al* on 140 women who had undergone either non-oncoplastic or oncoplastic treatment reporting 1 and 0 recurrences, respectively.<sup>27</sup> Finally, these results suggest that long-term survival of patients after oncoplastic treatment is comparable to that achieved after BCS.

One of the most common complications that has been reported after oncoplastic surgery has been fat necrosis which ranges from 8% to 27.3%.<sup>19,25-26</sup> Early surgical complication rates have also been investigated through different studies which showed the percentages ranging from 30% to 13.3%.<sup>16,18,19</sup> Most importantly, the presence of hematoma reported in 3.3% of the cases by *Meratoja et al*<sup>30</sup> and in 2.2% by *Clough et al*<sup>17</sup> is of utmost importance since wound healing problems can cause a delay in the cancer treatment. In our study, the complication rates reported were slightly higher in the oncoplastic group (4.9%) than the non-oncoplastic group (1.3%). In particular, patients in the oncoplastic group were seem to be affected repeatedly more often with hematoma and non-healing of the wound. So, the difference between the two groups was not statistically

significant ( $p=0.128$ ). These results are similar to the one reported by *Tenofsky et al*<sup>27</sup> where patients experienced more complications after oncoplastic surgery compared to the standard non-oncoplastic treatment; in particular, patients reported a higher rate of fat necrosis (25.9% vs. 9.5%) and more non-healing wounds.

## CONCLUSION

From this study it has been concluded that the oncoplastic surgery can be proposed for patients with tumours with unfavourable characteristics for traditional breast conservation surgery. Although it is used for the treatment of larger and multifocal tumours and surgical re-excisions were less often performed and was not related to higher rates of conversion to mastectomy or increased risk of local recurrence. Even though the overall complications were higher in the oncoplastic group, the incidence of major complications were similar in both groups. It should be considered as a safe tool to expand the indications of breast conservation surgeries.

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