Batwing mammoplasty: a safe oncoplastic technique for breast conservation in breast cancer patients with gigantomastia

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ABSTRACT

BACKGROUND Surgical management of breast cancer with gigantomastia can be challenging when planning breast conservation, as major breast reduction is required. Complex oncoplastic procedures can carry an additional surgical risk in this situation. We suggest batwing mammoplasty as a simple and safe oncoplastic procedure for those patients.

MATERIALS AND METHODS Fourteen patients with gigantomastia diagnosed with breast cancer were included in this prospective cohort study. All underwent batwing mammoplasty and contralateral symmetrisation procedure between May 2016 and June 2018. Patient satisfaction assessed by the Breast-Q questionnaire.

RESULTS All patients had a body mass index above 30 kg/m² with a mean of 36.7 kg/m² (range 31.6–44.9 kg/m²). The mean distance from midclavicular point to nipple was 42 cm (range 38–50 cm). The mean operative time was 83 minutes for procedures done by a single surgeon. Mean specimen weight was 1.2 kg (ranging from 1.035–1.63 kg). Postoperative complications occurred in 14.2% of patients. Nipple–areola complex viability was not compromised nor sensation impaired. The mean Breast-Q score for patient satisfaction with breasts was 68.6 (range 61–74). The mean score for physiological wellbeing was 77.3 (range 64–84) and the mean score for physical wellbeing was 35 (range 31–40).

CONCLUSION Batwing mammoplasty is a safe and simple oncoplastic procedure in patients who have breast cancer with gigantomastia. It has short operative time and low complications rate. In our cohort of patients, there was no delay in the delivery of adjuvant treatment. The cosmetic outcome was favourable with a high patient satisfaction.

KEYWORDS

Gigantomastia – Oncoplastic – Breast conservation

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Introduction

Breast-conserving surgery has been long established as the standard of care for breast cancer management whenever suitable.¹ The development in oncoplastic procedures has further expanded the scope for breast conservation.² Oncoplastic breast surgery has emerged as a new discipline balancing the oncological safety of oncological breast-conserving surgery with the favourable cosmetic outcomes of plastic surgery.³ Clough *et al* classified oncoplastic surgery into level 1 and level 2 based on the degree of complexity of the surgery,⁴ with level 1 techniques suitable to be performed by general surgeon with no special oncoplastic training and involves simple glandular reshaping. Level-2 procedures are mainly based on the plastic surgery techniques for reduction mammoplasty. Therapeutic mammoplasty is performed by surgeons trained in complex oncoplastic

procedures as it involves complex breast reshaping and preservation of the nipple–areola complex based on various pedicles.⁵

In some situations, oncoplastic procedures are not only beneficial for adequate cosmetic outcome after major breast resection, but also necessary to allow the patient to have radiotherapy, an integral part of breast-conserving treatment.⁶ This is particularly relevant for patients with gigantomastia. Gigantomastia is a rare condition characterised by excessive breast growth and can be physically and psychosocially disabling for the patient.⁷

Dancy *et al* defined gigantomastia as excessive breast growth of over 1.5 kg per breast.⁸ In their landmark paper, they have classified the condition into three subgroups according to aetiology. Group 1 is idiopathic in nature, quiescent and can be managed with a breast reduction in the first instance, and tends to have a good prognosis. This

group was further subdivided into two subgroups based on the body mass index (BMI; with 30kg/m^2 as a cutoff point). Group 2 is a result of endogenous hormone imbalance (pregnancy or juvenile) and presents with very aggressive and unremitting breast growth. They often require multiple reductions and consideration should be given to a primary mastectomy with breast reconstruction. Group 3 is drug induced and responds well to cessation of therapy with or without breast reduction.⁹

Many authors defined a 1kg breast resection weight as the cutoff limit for gigantomastia.^{10–14} Karacor-Altuntas and colleagues also added a preoperative midclavicular to nipple distance of at least 38cm in their inclusion criteria.¹⁴ We opted to use this criterion in our study to allow preoperative selection of patients.

A large breast size is recognised as a major risk factor for occurrence of acute skin toxicity and late adverse effects following radiotherapy.^{15–17} Patients with gigantomastia and breast cancer are at a higher risk to develop extensive radiotherapy induced skin toxicities. Without a major breast reduction procedure, those patients would be recommended to have a mastectomy as the oncologically safe treatment for breast cancer.¹⁸

A level 2 complex oncoplastic procedure carries a higher risk for surgical complications particularly as all type 1a gigantomastia patients have a BMI higher than 30kg/m^2 and at least one major comorbidity. Surgical complications can cause significant delay in wound healing and therefore affect timely delivery of adjuvant treatment which can have negative implications on the long-term oncological outcomes.¹⁹

In our study, we propose the batwing mammaplasty technique as a simple oncoplastic technique for breast conservation and major reduction in patients with type 1a gigantomastia. We aim to demonstrate this technique to have short operative time, very low complications rate, no delay in the delivery of adjuvant treatment and favourable cosmetic outcome with high patient satisfaction.

Material and methods

This is a prospective cohort study that was carried at the National Cancer Institute, Cairo University, a large tertiary referral cancer centre treating more than 1000 breast cancer patient every year in Egypt. It included 14 patients with gigantomastia who were diagnosed with breast cancer. They all underwent oncoplastic breast-conserving surgery in the form of batwing mammaplasty and contralateral symmetrisation procedure between May 2016 and June 2018. Gigantomastia was defined by a midclavicular point to nipple distance of at least 38cm and a minimum weight of resected specimen of 1kg. All included patients had breast cancer of any size involving the upper half of the breast.

Data were collected prospectively and included patient's characteristics of age, BMI and medical comorbidities. Tumour characteristics were also recorded. Those are summarised in Table 1. Distance from midclavicular point to nipple and specimen weight were recorded.

The cosmetic outcome was analysed by using the Breast-Q questionnaire at a median of 3 months after receiving adjuvant radiotherapy to allow for the resolution of post-radiation skin changes.²⁰ Questions regarding postoperative satisfaction with breasts, physiological and physical wellbeing were translated by the doctor to the patients and a scale of the answers was documented. The primary endpoint was postoperative complications within six months. The secondary outcome was patient satisfaction assessed by the Breast-Q questionnaire.

Surgical technique

Preoperative marking was done with the patients in the standing position. The breast meridian was marked, followed by marking the new desired nipple position. The new areola position was marked at a point at the breast meridian situated at the same distance between the original nipple and areola. From this point a semicircular mark was made, measuring the same diameter as the original areola, then two lines were extended horizontally or upwards according to tumour location to the medial and lateral borders of the breast. Finally these two lines were connected to the medial and lateral midpoints of the areola completing the batwing design (Fig 1).

In patients requiring sentinel node biopsy, patent blue dye was injected subareolar subdermally towards the upper outer quadrant. An incision was made first with the scalpel around the upper half of the areola and extending to the marked lines. The incision was continued with a coagulation diathermy directly downwards through subcutaneous and breast tissue with no glandular flap elevation until the pectoralis fascia. Then the axilla was entered through identifying the lateral border of pectoralis major muscle and incising the clavipectoral fascia. Sentinel lymph nodes were identified and sent for frozen section with patients with axillary nodal metastases proceeding to have axillary evacuation. One patient had the tumour location at the axillary tail near the skin and had a separate

Table 1 Patient characteristics.

Characteristic	Measurement
Age (years)	41–66 (mean 50)
Body mass index (kg/m^2)	31.6–44.9 (mean 36.7)
Midclavicular point to nipple distance (cm)	38–51 (mean 42)
Tumour location, <i>n</i> (%):	
Upper outer quadrant	14 (93.3)
Upper inner quadrant	1 (6.6)
Comorbidities, <i>n</i> (%):	
Diabetes	4 (28.5)
Hypertension	2 (14.2)
Diabetes and hypertension	2 (14.2)

Figure 1 Preoperative marking.

Figure 2 A 57-year-old patient with right upper outer breast cancer post-neoadjuvant chemotherapy and wire insertion (body mass index 36.7kg/m^2 , mid-clavicular point to nipple distance 43cm at right breast, 42cm at left breast; specimen weight was 1.57kg from the right breast and 1.46kg from the left breast). a) Preoperative view. b) Following resection of specimen and axillary evacuation. c) Resected specimen including localisation wire. d) Breast approximation following resection. e) Postoperative result six months after surgery.

Figure 3 A 49-year-old patient with right upper outer quadrant breast cancer (body mass index 37.6kg/m^2 , mid-clavicular point to nipple distance 50cm at the right breast, 48cm at left breast; specimen weight was 1.63kg from right breast and 1.58kg from left breast). a) Preoperative view. b) Postoperative result seven months after surgery.

Figure 4 A 63-year-old patient with right upper outer quadrant breast cancer (body mass index 37.8kg/m^2 , mid-clavicular point to nipple distance 40cm at the right breast, 41cm at the left breast; specimen weight was 1.1kg from the right breast and 1.07kg from the left breast). a) Preoperative view. b) Postoperative result 10 months after surgery.

incision done to excise the tumour and undergo axillary evacuation.

Results

Fourteen breast cancer patients with gigantomastia underwent oncoplastic batwing resection at the National Cancer Institute, Cairo University, from May 2016 to June 2018. In 10, the cancer was in the right breast, in 3 it was in the left breast and 1 had bilateral breast cancer. The mean age of the patients was 51.7 years (range 37–63 years). All patients had a BMI above 30kg/m^2 with a mean of 36.7kg/m^2 (range $31.6\text{--}44.9\text{kg/m}^2$). The mean distance from midclavicular point to nipple was 42cm (range $38\text{--}50\text{cm}$).

Six patients were operated by a single surgeon doing the bilateral procedures, while in eight patients, a two-team approach was carried with two consultant surgeons operating simultaneously. The mean operative time was 83 minutes for procedures done by a single surgeon and 52 minutes for procedures done by two surgical teams. The average duration of hospital stay was 2.2 days (range 2–3 days).

The mean tumour size was 5.25cm (range 2–5cm). The least safety margin was 0.5cm while the largest was 14cm. Mean specimen weight was 1.2kg (range 1.035–1.54kg; Figures 2–4). The mean follow-up period was 14 months (range 5–30 months).

Five patients received neoadjuvant chemotherapy, three of them had a complete clinical response and required wire localisation. Four patients had sentinel node biopsy while the rest had axillary clearance. Eight patients (57%) had at least one comorbidity, namely diabetes ($n = 6$) and hypertension ($n = 4$), with two of them having both diabetes and hypertension.

Two patients (14.2%) had postoperative complications. One (7%) had wound gapping that required secondary closure in theatre. Another patient developed minor wound breakdown and fat necrosis. The wound gapping occurred in the patient with diabetes in whom the tumour was resected via a separate lateral incision. Fat necrosis occurred in the patient with the longest distance of midclavicular point to nipple (50cm). No other complications have been observed. Nipple–areola complex viability was not compromised nor sensation impaired.

All patients received adjuvant radiotherapy as the standard of care after breast-conserving surgery. Five patients received neoadjuvant chemotherapy, with four of them receiving additional trastuzumab. Six patients received adjuvant chemotherapy and nine patients received adjuvant hormonal therapy. The mean Breast-Q score for patient satisfaction with breasts was 68.6 (range 61–74). The mean score for physiological wellbeing was 77.5 (range 64–84). And the mean score for physical wellbeing was 35 (range 31–40).

Discussion

Gigantomastia can be a challenging condition to manage especially when combined with breast cancer where breast-conserving treatment is considered. Adjuvant radiotherapy is an integral part of breast-conserving treatment. The delivery of radiotherapy in these patients can prove to be difficult due to the large size of the breast. This makes a therapeutic mastoplastic with adequate volume reduction a procedure of choice in this group. On the other hand, all patients with type 1a gigantomastia have high BMI and most of them have at least one other comorbidity.² A level-2 oncoplastic procedure such as therapeutic mastoplastic with the traditional Wise-pattern approach has a higher complications rate in this situation.²² This can have implications for the delivery of adjuvant treatment for breast cancer and can therefore adversely affect long-term oncological outcome.²³

We suggest the batwing mastoplastic as a therapeutic mastoplastic technique that can achieve the oncologic resection required for breast conservation together with the reduction needed for adequate radiotherapy delivery. It is a simple procedure with short operative time, minimal complications and acceptable cosmetic outcome and high patient satisfaction.

One of the main advantages of the batwing technique is that it can be easily performed by breast or general surgeons with no special training in oncoplastic surgery. It does not involve extensive breast tissue mobilisation and skin refashioning as in the standard therapeutic mastoplastic techniques. The operative time is short, even when operating on the contralateral side with minimum complications. An even shorter operative time can be achieved with a two-team approach.

Many techniques have been described for breast reduction in gigantomastia. The original technique, based on the horizontal septum, was proposed by Würinger in 1999,²⁴ based on a central pedicle for nipple–areola complex. In her series of 42 patients, the average amount of resected breast tissue was 712g (range 250–2100g). The good results and low complication rate in her series showed the reliability of this technique, which seems safe even in very large resections. However, the few cases of large resections in this series (disparity of cases) seem not sufficient to conclude whether this technique could be regularly used in gigantomastia cases. Hamdi *et al* described a reduction technique where the nipple–areola complex is kept on a lateral or medial based pedicle.²⁵ In this way, blood supply from the lateral thoracic (superolateral pedicle) and internal mammary artery (superomedial pedicle) is included in the pedicle in addition to the blood supply from the intercostal perforators. Mojallal *et al* described the posterosuperior pedicle technique with preservation of the horizontal septum of the breast.²⁶ All these techniques are complex and require special training. None has been validated in the therapeutic context of breast-conserving surgery for treatment of breast cancer.

One of the limitations of the batwing technique is that it can only be applied to tumours in the upper half of the breast. Another limitation is that the lower pole of the breast is left intact in this reduction technique. This may have a limiting effect on the weight of the specimen to be resected.

To the best of our knowledge this is one of the first studies where the batwing mastoplastic technique is described for breast-conserving treatment in patients who have breast cancer with gigantomastia, a group of patients that can present a real challenge to breast surgeons.

The data were collected prospectively and this adds to the strength of the study conclusions. However, we recognise the limitations of our study. A major limitation is the small number of patients. Gigantomastia is not a common condition. We have strictly adhered to the inclusion criteria for patients with gigantomastia and breast cancer in the upper half of the breast. This may limit the conclusions inferred from our results.

Conclusion

We recommend the batwing mastoplastic as a safe oncoplastic technique for breast-conserving surgery in patients with type 1a gigantomastia and breast cancer. It is a simple procedure that does not require specialist oncoplastic training. It has short operative time and very

low complications rate. In our cohort of patients, there was no delay in the delivery of adjuvant treatment. The cosmetic outcome was favourable with a high patient satisfaction.

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