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Innovative combination of therapeutic mammoplasty and expandable-implant breast augmentation for immediate partial breast reconstruction

A.M.H. Choo^a, P. Forouhi^b, C.M. Malata^{b,c,d,*}^a University of Cambridge, Cambridge, United Kingdom^b Cambridge Breast Unit, Cambridge University Hospitals NHS Foundation Trust, Cambridge, United Kingdom^c Department of Plastic and Reconstructive Surgery, Addenbrooke's Hospital, Cambridge University Hospitals NHS Foundation Trust, Cambridge, United Kingdom^d Postgraduate Medical Institute, Faculty of Health Sciences at Anglia Ruskin University, Cambridge, Chelmsford, United Kingdom

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ABSTRACT

INTRODUCTION: Therapeutic mammoplasty is used in the treatment of suitably-sized and appropriately-located breast cancers to achieve adequate cancer excision, resulting in well-shaped but smaller breasts. In patients wishing to maintain or increase their breast size, simultaneous augmentation will be required. **PRESENTATION OF CASE:** A 48-year-old female underwent an “augmentation-therapeutic mastopexy”. She required mastectomy for a multifocal cancer of the right breast and breast conservation for a unifocal localised cancer in the upper part of the left breast. She requested right immediate breast reconstruction and hoped for larger breasts than she had. Due to complications during neoadjuvant chemotherapy, the right reconstruction plan was changed from a deep inferior epigastric perforator (DIEP) flap to an implant-based technique. On the left, an extended superomedial pedicle therapeutic mammoplasty was combined with a subpectoral augmentation using an expandable-implant.

DISCUSSION: The use of expandable-implants for reconstruction of partial mastectomy defects in combination with therapeutic mammoplasty has not been reported. This case report shows that such “augmentation-therapeutic mastopexy” is feasible.

CONCLUSION: A “novel” oncoplastic technique herein termed “augmentation-therapeutic mastopexy” is described for partial breast reconstruction during the treatment of a patient with bilateral breast cancer. It enabled adequate treatment of her cancer while reshaping the breast and achieving the desired larger breast size. It should be considered in selected breast-conservation patients who wish to maintain or increase their breast size.

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1. Introduction

Therapeutic mammoplasty is a well-established treatment modality for suitably-sized and appropriately-located breast cancers. The Wise pattern is the most widely used mammoplasty technique for this purpose [1,2]. It is particularly suitable for patients with large and/or ptotic breasts. Therapeutic mammoplasty results in smaller breasts because of the wide tumour resection as well as the skin and gland resection necessary for surgical closure. This is desirable in many patients as it improves cosmetic outcome, allows more uniform delivery of postoperative radiotherapy (RT) and addresses macromastia symptoms [3]. The

technique can be used in women with smaller breasts to produce a better shaped post-treatment breast, but some patients may find the resulting smaller breasts undesirable. Patients who wish to maintain their breast volume may therefore request simultaneous augmentation of their breast.

Breast enlargement in this setting can be accomplished with the use of fixed-volume implants or expandable-implants (so called “permanent expanders”). Although expandable-implants are widely used in post-mastectomy immediate breast reconstruction [4,5], their use has not been hitherto described for partial breast reconstruction in combination with therapeutic mammoplasty.

We present a patient who underwent such an “augmentation-therapeutic mastopexy”, simultaneously treating her tumour located superiorly above the nipple-areolar complex (NAC), and achieving her desire to enlarge her pre-existing breast size.

* Corresponding author at: Department of Plastic and Reconstructive Surgery, Addenbrooke's Hospital, Cambridge University Hospitals NHS Trust, Cambridge, CB2 2QQ, United Kingdom.

E-mail address: cmalata@hotmail.com (C.M. Malata).

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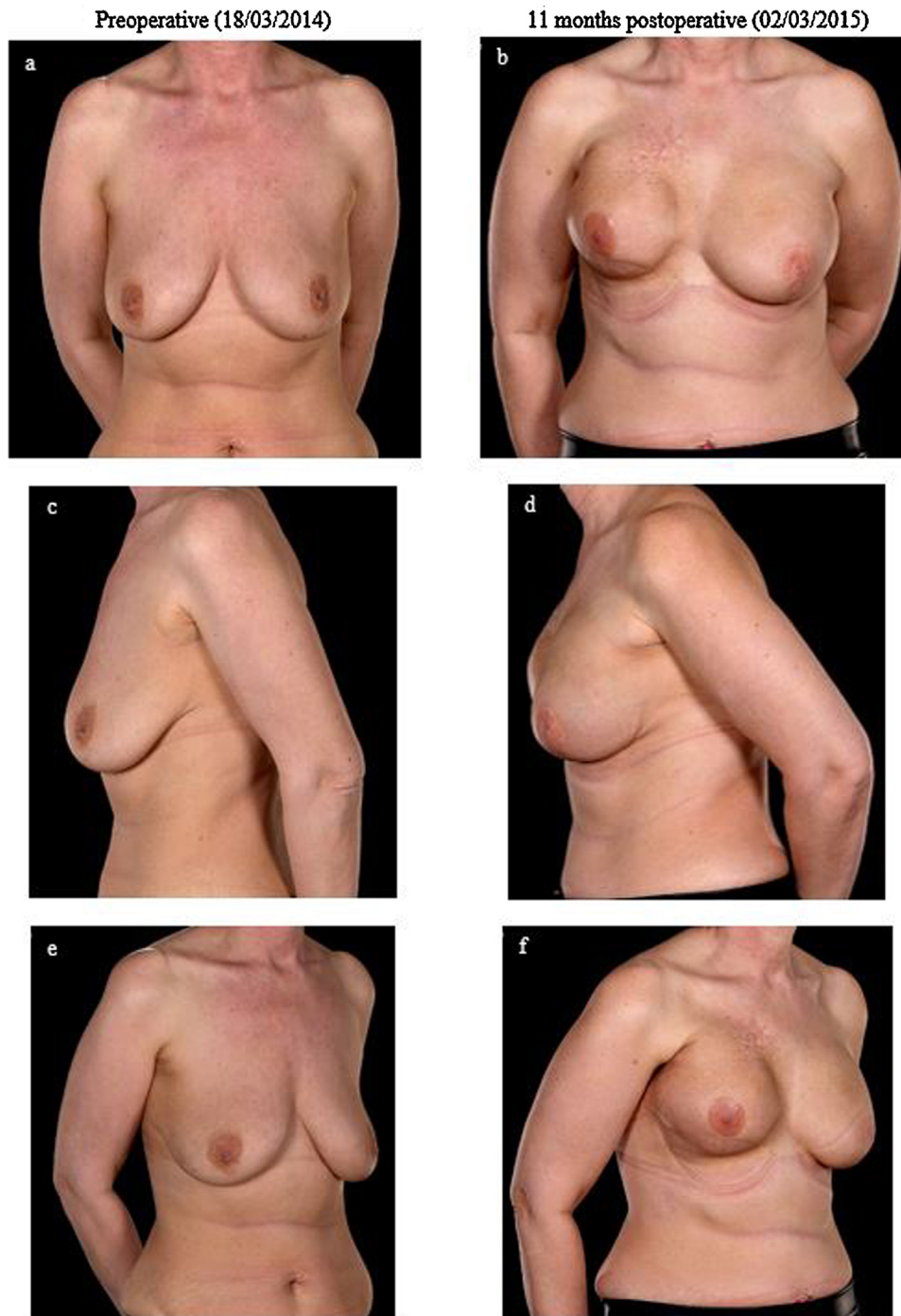


Fig. 1. Preoperative and 11-month postoperative photographs of the 48-year-old patient (BMI = 22, bra cup size = 34D, Grade II ptosis) (anteroposterior, left lateral, right oblique views). Please note the prosthetic nipple on the mastectomy (right) side.

2. Presentation of case

A 48-year-old female (Fig. 1) presented with a multifocal lobular cancer of the right breast (requiring mastectomy) and a smaller localised tubular carcinoma of the left breast. She requested right immediate breast reconstruction (IBR) and hoped for larger breasts than she had. She was scheduled for bilateral mastectomies and reconstruction with deep inferior epigastric perforator (DIEP) flaps. During neoadjuvant chemotherapy she lost significant weight and ruptured a thoracic disc, making a DIEP flap contraindicated. She was offered expandable-implant and Strattice™ (porcine-derived acellular dermal matrix (ADM)) reconstruction on the right, and a

therapeutic mammoplasty with expanded-implant augmentation on the left.

Bilateral Wise pattern skin reduction markings were made prior to surgery (Fig. 2). A right mastectomy and level 2 axillary clearance were performed (specimen weight = 398 g, skin ellipse = 35 mm × 25 mm) and a reconstruction undertaken with an expandable-implant (nominal volume = 495–520 cm³) with 50 ml of intraoperative saline fill. The Strattice™ strip (10 cm × 16 cm) was sutured to the inferolateral border of the pectoralis major muscle and the inframammary fold to cover the inferolateral portion of the expander.

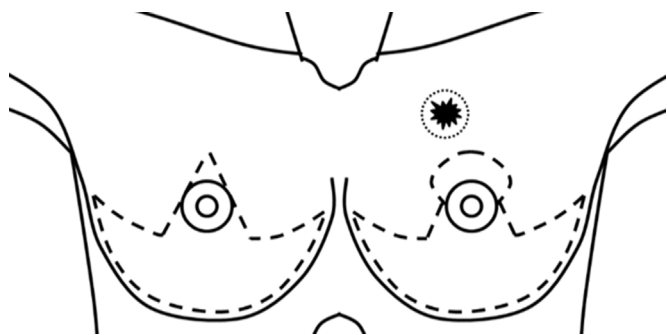


Fig. 2. Planned surgical incisions (Wise pattern) for the right mastectomy and left therapeutic mammoplasty. Please note the nipple preservation on the left therapeutic mammoplasty side.

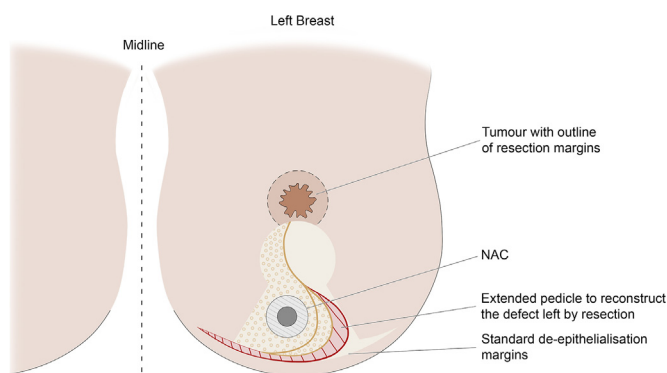


Fig. 3. Schematic diagram showing a left nipple-areola preserving Wise pattern therapeutic mammoplasty with extended superomedial pedicle prior to transposition into the lumpectomy defect at 12 o'clock.

A simultaneous left Wise pattern therapeutic mammoplasty with an extended superomedial pedicle (Fig. 3) was carried out with the extension transposed into the tumour excision defect. The tumour located in the breast meridian superior to the nipple-areolar complex (NAC) was widely excised with at least 1 cm margins radially using the previously-deployed guide wires/coils (specimen weight = 16 g). The completeness of resection was confirmed by intraoperative specimen radiographs (Fig. 4). A sentinel lymph node biopsy was then performed through the breast incision. Next, an expandable-implant (nominal volume = 295–315 cm³) was inserted into the subpectoral pocket with 50 ml of intraoperative saline fill. The wide local excision defect above the neo-NAC position was reconstructed by the transposition of superomedial pedicle extension and secured with interrupted 2/0 PDS. Glandular tissue rearrangement was achieved using 2/0 PDS. Both breasts were closed in a standard manner over suction drains.

Histological examination confirmed complete disease excision bilaterally and negative left sentinel lymph nodes. The patient was reviewed regularly in clinic postoperatively and four weekly expander inflations yielded saline fill volumes of 485 ml (right) and 310 ml (left). She received postoperative right chest wall and left breast RT (40 Gy in 15 fractions with left tumour bed boost at 12 Gy in 4 fractions). Her preoperative and 11 month postoperative (post-RT) appearances are shown in Fig. 1. Although she developed Grade IV capsular contracture secondary to RT despite the StratticeTM ADM support on the right (Fig. 1), there was no evidence of capsular contracture on the left therapeutic mammoplasty side (Fig. 5). The right breast was subsequently treated with a right free flap salvage after a failed capsulectomy and implant exchange.

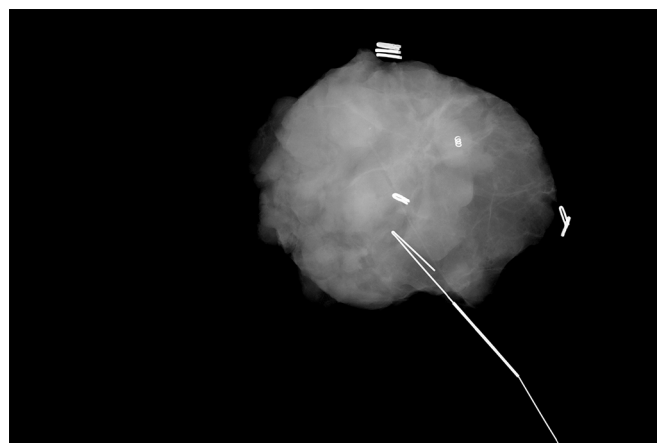


Fig. 4. Intraoperative radiograph with wire and coil deployed confirming the completeness of excision.



Fig. 5. Severe soft tissue reaction to radiotherapy (12 days after its completion). Note the prosthetic nipple in situ on the right.

3. Discussion

Most oncoplastic surgical techniques utilise breast parenchymal rearrangements after full-thickness resections of skin and glandular tissue or employ established breast reduction or mastopexy patterns to enable wide tumour resections while preserving or enhancing the shape of the remaining breast [6]. This often necessitates concomitant contralateral balancing surgery for optimal symmetry [7]. 95% of patients undergoing immediate partial breast reconstruction using therapeutic mammoplasty require a contralateral breast reduction [8]. Other techniques employed include mastopexy, breast augmentation, augmentation-mastopexy, and mastectomy and bilateral immediate breast reconstruction (IBR) [9]. Breast augmentation for contralateral balancing breast surgery is indicated in patients with small breasts. It is, however, unreported to augment a breast simultaneous with tumour treatment by therapeutic mammoplasty and removal of the contralateral breast by mastectomy with immediate prosthetic reconstruction.

3.1. The contralateral breast

Reduction mammoplasty and simple mastopexy are the most common symmetrising procedures following unilateral post-mastectomy breast reconstruction [10]. Symmetrisation can be undertaken as a primary or delayed procedure based on the patient and surgeon preference, and also patient selection [11,12]. It is

carefully considered or withheld till margin status and the need for further oncological survey is known [3]. This may change the size and shape of the index breast, and one may find that the previously reduced breast now does not match the cancerous breast. Additionally, the index breast will undergo postoperative radiotherapy (RT), potentially increasing breast asymmetry if contralateral symmetrisation is done as a primary procedure [1,13]. The irradiated (therapeutic mammoplasty) breast may become bigger (due to chronic oedema from impaired lymphatic drainage) or smaller (consequent to RT-induced fat necrosis, fibrosis and atrophy) [11]. In the Cambridge Breast Unit (CBU) it is preferred to undertake simultaneous contralateral breast reduction, as most patients desire this and CBU's radiation regimens have not found radiation-induced breast shrinkage or fibrosis to be a major problem. The latter may be because CBU routinely leaves the opposite non-cancerous breast at least 10% bigger than the index breast, similar to the Emory University group's recommendations [1].

Some patients may have small and ptotic breasts and require an augmentation-mastopexy. This procedure is complex [14] and less frequently utilised. Principal among the challenges is the difficulty in balancing the conflicting objectives of ideal augmentation and degree of breast lift. Without careful preoperative surgical execution, there is a high risk of recurrence of breast ptosis [15]. It is therefore not surprising that augmentation-therapeutic mastopexy has not been reported as simultaneous balancing surgery for contralateral immediate prosthetic breast reconstruction. However, the present case report shows that the technique can be successfully performed with good results.

Our patient posed a number of challenges. These included her request to have larger breasts than she had preoperatively, the chemotherapy-induced complications precluding the use of an abdominal flap, and the requirement for postoperative RT.

3.2. Postoperative radiotherapy effects on total and partial breast reconstruction

The need for postoperative bilateral RT in this patient was determined preoperatively using the Cambridge Radiotherapy Index [16]. RT can lead to fibrosis, compromised skin and soft tissue quality, increased possibility of complications from reconstruction, and a suboptimal aesthetic result [17]. Our patient demonstrated this on the mastectomy side with the severe capsular contracture necessitating total capsulectomy and implant exchange. The RT-induced tissue damage was so severe that a few weeks after surgery, she developed wound dehiscence and implant exposure culminating in explantation. This has subsequently been successfully salvaged by conversion to a totally autologous deep inferior epigastric perforator (DIEP) flap [18].

Irradiating the reduced or uplifted breast presents a different set of problems, notably fat necrosis, contraction or fibrosis of breast tissue and chronic lymphoedema of breast tissue and skin (after therapeutic mammoplasty). It may make the reduced breast firmer [17], indurated and difficult to shape later. Hence, the MD Anderson group prefers to perform the contralateral balancing reduction sequentially, after RT [3]. Interestingly, our patient did not develop any of these problems on the side of the "augmentation-therapeutic mastopexy" despite the severe RT reaction on the side of the mastectomy, and the expandable-implant could be inflated satisfactorily. It was not feasible to undertake the therapeutic mammoplasty at a later date as the patient had cancer in this breast—the therapeutic mammoplasty was being used not only for the symmetrisation purposes but also for the cancer treatment.

3.3. "Augmentation-therapeutic mastopexy"

Similar to therapeutic mammoplasties, the "augmentation-therapeutic mastopexy" herein described is easy to incorporate into the practice of surgeons who routinely perform cosmetic reduction mammoplasties and mastopexies. It is a useful addition to the reconstructive armamentarium available for partial mastectomy defects in women with suboptimal breast shapes who also desire an increase in their breast size.

4. Conclusion

Augmentation-mastopexy for cosmetic breast surgery is well-established. It is, however, not been described for or in context of partial breast reconstruction. It enables the enlargement of the patient's breasts while reshaping the breasts and adequately treating a suitably located breast cancer. "Augmentation-therapeutic mastopexy" is a novel technique which should be considered in selected patients.

Conflict of interest

None.

Funding

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Ethical approval

Not applicable - case report.
Patient consent obtained for publication.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Choo A: Design, literature search and write-up.
Forouhi P: Write-up and editing.
Malata CM: Design, write-up and editing.

Guarantor

Professor Charles. M. Malata.

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