Oncoplasty as the Standard of Care in Breast Cancer Surgery

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Abstract

Oncoplastic surgery is redefining breast cancer surgery today. Despite the lack of randomised clinical trials, current evidence suggests at least equivalent oncological outcomes, reduced re-excision rates and superior aesthetic results. This review outlines the arguments for the superiority of this new approach over the current standard of care and discusses some of the difficulties with regards to training and mentoring the next generation of surgeons.

Keywords

Oncoplastic surgery, breast-conserving treatment, breast cancer, breast reconstruction

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Over the last two decades, the field of oncoplastic surgery (OPS) has been established and continually refined, representing a major advance in breast cancer surgery. After establishing the safety of breast-conserving treatment (BCT) in the 1980s, there has been an increasing demand on the part of both patients and surgeons for better aesthetic outcomes and improved quality of life after breast cancer surgery. This demand led to the development of more sophisticated surgical techniques, combining principles in plastic surgery and surgical oncology to prevent the common deformities that previously occurred after standard BCT.

Although the benefits of OPS with respect to larger specimens, wider margins and improved cosmesis seem obvious, the lack of level 1 evidence comparing it to standard BCT has led to some controversy. Can a new surgical technique become the new standard of care without having the highest level of evidence in the literature? The introduction of sentinel node biopsy in the 1990s was quickly implemented into clinical practice, as it was clear how to compare it with the previous standard of axillary dissection in randomised trials. OPS, however, encompasses too many different techniques and variables to easily compare it with standard BCT in a well conducted randomised clinical trial. In fact, OPS is a new method and surgical philosophy, rather than a single technique, and a true surgical refinement of BCT.

So, the aim of this review is to revisit the history, concept, philosophy and results of OPS, and to discuss how the lack of specific training and mentoring in this field has led to significant barriers in its wider acceptance and utilisation for breast cancer surgery.

History, Concept And Philosophy

Historically it is difficult to define when, where and how the first time a mammoplasty technique was used in BCT with the aim of reducing deformities. There were a number of non-academic surgeons, in different countries, who were doing this kind of surgery sporadically, even before its appearance in the literature. The German surgeon Werner Audretsch originally coined OPS, and there is little doubt that its practice began in Europe, most probably in France, where it was formally introduced in a number of different oncological centres. Deformities due to BCT were even more frequent at that time, when wider margins (with a variation of 1 to 5 cm in some series) were considered crucial to local control of disease, resulting in larger resections. In addition, radiotherapy techniques were less refined, resulting in more adverse effects on aesthetic outcomes (see *Figure 1*). These poor outcomes led to pioneering work by plastic surgeons to introduce aesthetic techniques into BCT, most notably Jean-Yves Petit at Gustave-Roussy, Jean-Yves Bobin at Léon-Bérard and Michel Abbes at Lacassagne Center.[1–6]

But it was in the central quadrant of the breast where the collaboration between oncological surgeons and plastic surgeons was strongly established early on, as a real necessity in BCT. Here, it was not only to achieve a better aesthetic result, but also to avoid mastectomy, which was a frequent indication in these cases. In 1993 Galimberti, at the National Cancer Institute in Milan, published a series of 37 consecutive patients who underwent a central quadrantectomy with immediate breast reconstruction, using OPS methodology.[5] In 2003, Clough from the Institut Curie in Paris published a consecutive series of 101 patients, demonstrating that OPS allowed for extensive resections in all breast quadrants without compromising aesthetics, which is considered one of the pillars of OPS.[6]

But the greatest change with OPS is a philosophical one: to combine concepts of two different surgical specialties with seemingly opposite goals. Traditionally, plastic surgery and surgical oncology were two separate and non-interchangeable surgical specialties. These boundaries were respected not out of appreciation of the individuality of each specialty, but due to the fear that plastic surgery techniques would be less

Figure 1: Two Patients with the Same Tumour Size, Biology, TNM Stage Shown 20 Years After their Breast-conserving Sequence

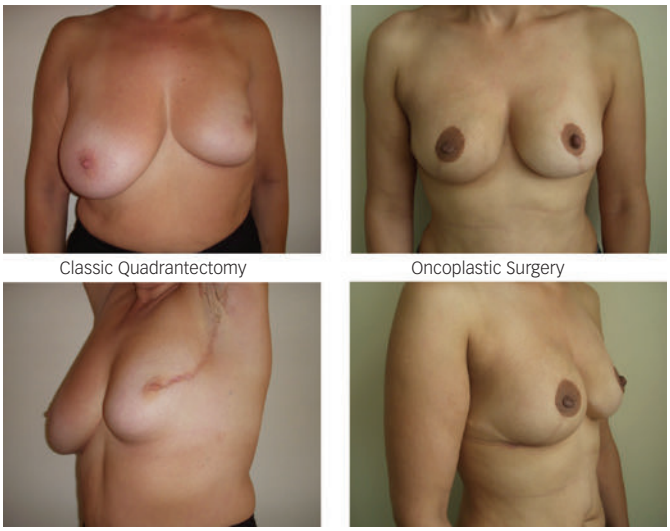
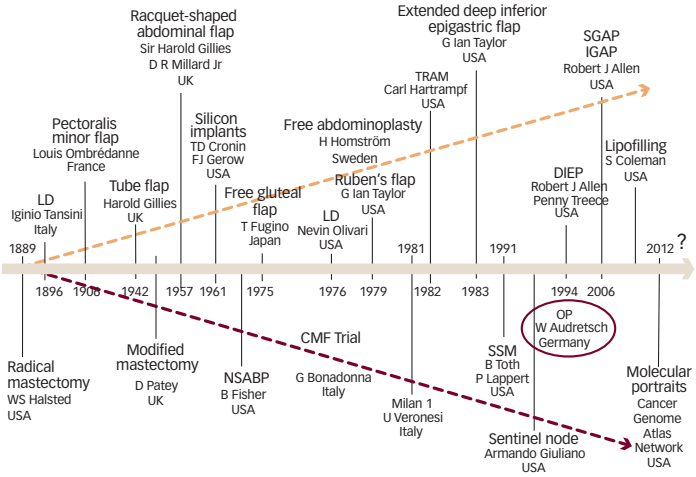


Figure 2: Oncological and Reconstructive Historical Pathways in Breast Cancer Surgery



In the upper part are reconstructive developments and in the lower part oncological developments. DIEP = deep inferior epigastric perforator flap; IGAP = inferior gluteal artery perforator; LD = latissimus dorsi; NSABP = National Surgical Adjuvant Breast and Bone Project; OP = oncoplastic; SSM = skin sparing mastectomy; SGAP = superior gluteal artery perforator; TRAM = transverse rectus abdominus myocutaneous.

aggressive, optimising the aesthetic outcome and thus compromising the oncological radicality of the surgery, potentially leading to increased recurrences and decreased survival. It is clear, when analysing the progress of these two specialties in breast cancer surgery, that they have followed divergent pathways over the last 20 years (see *Figure 1*). While in plastic surgery the techniques have become even more sophisticated and complex, culminating in microsurgical flaps, in surgical oncology and breast surgery the techniques have become more individualised and less invasive. This divergence arrived at a possible point of convergence between the two specialties with the emerging concept of OPS in the 1990s (see *Figure 2*), where both specialties slowly began to advance in congruence. As the breast is an aesthetic and functional organ, surgery should take into account its importance to femininity and a woman's identity, not just maximising locoregional control.

Initially, Audretsch considered the original concept of OPS to be tumour-specific immediate reconstruction, or an immediate reconfiguring after partial or total mastectomy. This view was not shared by all surgeons, and did not achieve a consensus in the academic community, as some surgeons considered OPS as limited only to BCT. Now, after skin and nipple-sparing mastectomy techniques have become popularised, it is clear (although it was not considered a consensus until now) that the original concept was correct, and that the concept of OPS should not be limited to partial mastectomies. So, OPS is now considered a well-conducted oncologic resection, followed by immediate breast reconstruction, taking into consideration contralateral breast symmetry in the same surgery.

Oncological and Aesthetic Results

OPS, now referring to simultaneous mammoplasty or breast reshaping and partial mastectomy in this review, is a technique that has been utilised throughout the world for more than 20 years. Its use has become more and more popular as a means to radically resect the tumour and leave the patient with an improved, if not excellent, aesthetic result. Over the past decade, the increased use of this methodology is demonstrated by the increasing number of original scientific articles published on oncoplasty, multiple new books and chapters written on this topic, the increased number of international breast meetings completely devoted to or with significant portions dedicated to OPS and, most importantly, formal training programmes resulting in competence in OPS.[7]

Despite this surge in interest and practice of OPS, there remains no prospective randomised clinical trials comparing this new approach with the standard BCT, and the quality of the reported studies seem to be less than ideal.[8,9] In their review of 11 prospective oncoplastic studies, Haloua and colleagues[9] demonstrated a 7–22 % positive margin rate in OPS compared with the 20–40 % accepted rate in standard BCT. This significant difference should result in a lower rate of re-excisions and better aesthetic outcomes. In fact, Haloua demonstrated good cosmetic outcomes in 84-89 % of patients, which is higher than typically reported in standard BCT.[10] Importantly, they also demonstrated significantly higher scores for quality of life measures when comparing OPS and standard BCT. We summarise the results of the prospective studies[11–22] in *Table 1*. A recent meta-analysis by Losken[23] demonstrated larger resection volumes, increased satisfaction with aesthetics and decreased rates of positive margins, re-excisions and local recurrences for OPS, although follow-up was admittedly shorter term. No significant delay in adjuvant chemotherapy and radiotherapy has been documented despite the increased complexity of these surgeries and inherent higher risk of complications.[24,25] Long-term survival has been demonstrated to be equivalent for the two surgical approaches thus far.[26] The cosmetic outcomes of OPS have been demonstrated to be superior in a number of different studies, but the stability of these result and relevance of these findings to an improved quality of life is currently unclear. A valid concern over the OPS approach is the reliability of clips placed for the purposes of a radiation boost, although advances in intraoperative radiation therapy may make this less of a concern. Tissue rearrangement during oncoplasty might result in a larger, less exact boost during external beam radiation therapy possibly resulting in a poorer aesthetic outcome and decreased local control of disease.[9]

This begs the question why such an increasingly popular technique does not have level I evidence supporting its practice. There are several

Table 1: Oncological and Aesthetic Outcomes in Prospective Studies of Oncoplastic Surgery Series

Author	Year	Number	Tumour Size (mm)	Positive Margins (%)	Re-excision Rate (%)	Follow-up (Months)	Local Failure (%)	Aesthetic Failure (%)
Bong[11]	2010	167	NR	22	10	NR	NR	NR
Chan[12]	2010	162	2.5	NR	NR	NR	NR	6
Clough[13]	2003	101	3.2	7	NR	46	9	18
Giacalone[14]	2007	31	2.0	10	0	NR	NR	NR
Gulcelik[15]	2011	101	NR	6	3	NR	NR	NR
Kaur[16]	2005	30	2.0	3	NR	NR	NR	NR
Meretoja[17]	2010	90	NR	12	0	26	0	16
Rietjens[18]	2007	148	3.2	5	NR	74	3	NR
Rusby[19]	2008	110	3.4	5	2	41	1	NR
Veiga[20]	2010	45	NR	NR	NR	12	2	NR
Veiga[21]	2011	45	NR	NR	NR	12	1	NR
Yang[22]	2011	58	NR	NR	NR	21	0	17

potential explanations for this lack of evidence. From an oncological perspective, it seems intuitive that resecting larger volumes of tissue with larger margins should be at least equivalent oncologically to standard BCT. Despite this rather intuitive point, it may still be of value to demonstrate a possible superior outcome using OPS with regards to local recurrence and rates of re-excision. In addition, randomising patients to OPS versus BCT would best be performed by surgeons familiar with both techniques. In most countries, standard BCT is performed most commonly by general surgeons or breast surgeons, and OPS is typically performed by a team of oncological and plastic surgeons, making a direct comparison difficult. It is also possible that skilled oncoplastic surgeons might find it unethical to randomise a patient with macromastia or gigantomastia, a large tumour to breast size ratio, an inferior pole or retroareolar tumour to a technique (standard BCT) that they deem to be obviously inferior to OPS. In addition, patients would most likely be reluctant to be randomised to standard BCT rather than the 'new' OPS that has received so much positive media attention. In addition to the difficulties mentioned above, a trial would have to take into consideration tumour location, size, patient comorbidities, degree of ptosis, glandular versus fatty content of the breast and many other variables. Ultimately, OPS is individualised to each patient and is a combination of science and art. The oncoplastic surgeon uses his or her expertise in oncology and aesthetics and balances these factors with patient motivations and preferences, tissue quality and breast size and shape, age, previous breast surgeries, comorbidities, tumour location and size to come up with a custom-made operation for each patient. This complex process cannot easily be studied in a well-controlled prospective randomised trial to give a simplified answer as to whether OPS is as good as, or better than, conventional surgery. There are certain patients whose individual circumstances may benefit more or less from an oncoplastic approach, like those with gigantomasty, large resections (more than 20 % of breast volume), tumours in central, superior, medial and inferior quadrants.

Mentoring and Training Perspectives and Barriers

Mentoring is the provision of personal and professional guidance. Surgical education and maturation as a competent practitioner is highly dependent on this basic process. The advent of OPS will require different methods of mentoring and requires new strategies in teaching and setting limits to the mentee and between specialties. Leaders in OPS have an important role in this time of change as there is growing international interest in this new expertise and the benefits it provides to women with breast cancer. Surprisingly, there is no consensus between the many breast societies and plastic surgery societies all over the world in how to establish training programs despite the rapidly increasing number of surgeons from both specialties who are now interested in learning these techniques.

Table 2: Skills and Competence-based Classification for Oncoplastic Training and Mentoring

Level I –	Monolateral and displacement techniques – no specific competence in plastic surgery of the breast is required
Level II –	Bilateral and replacement techniques – specific competence in reduction mammaplasty techniques are required
Level III –	Expander/Implant techniques – competence in the indications, surgical techniques and management of complications of breast implants is required
Leve IV –	Autologous flaps techniques – competence in pedicled or free flaps, or combination of both are required

Table 3: Proposal of a Curriculum for Oncoplastic and Reconstructive Training

Levels	Disciplines	Credits/Hour
Basic Core Disciplines	Breast Cancer Molecular Biology	10/20
	Anatomy and Physiology of the Breast	10/20
	Epidemiology	10/20
	Bioethics and Legal Medicine	10/20
	Medical Photography	5/10
	Radiology of the Breast	10/20
	Breast Pathology	10/20
	Radiotherapy	5/10
	Breast Cancer Clinical Oncology	10/20
Basic Surgical Training	Level II techniques: 10 surgeries/technique	60 credits
	Level III techniques: 10 surgeries/technique	60 credits
Advanced Surgical Training	Level IV techniques: 10 surgeries/technique	60 credits
Total		260 credits

There are three generations of surgeons in this oncoplastic era. The first were the pioneers who began to do these surgeries between 1980 and 1990, mostly European surgeons, after the oncological legitimacy of BCT was established in the 1980s. The next generation

were breast surgeons who trained with some of the pioneers, or went to progressive plastic surgery departments to obtain specific training in plastic and reconstructive techniques. The third generation are the new breast surgeons who are receiving this training as part of their surgical curriculum, as in Brazil, or as a subspecialty of plastic surgery or general surgery, as is being carried out in the UK.

Between the second and third generations contains a group of surgeons who perform most of the breast cancer surgeries in the world. They do not have training in OPS and have had minimal opportunities to obtain such training. These surgeons are unable to offer breast reconstruction to most of their patients due to poor access to plastic surgeons willing to perform reconstructions. Many of these surgeons are now looking for training opportunities with short intensive courses in OPS to help them care for their patients. They are already specialised surgeons, with different degrees of experience and technical skills in breast surgery. How do we provide practical guidance for mentors to help these colleagues? What are the implications for mentoring? What are the limitations for these different courses? By who and how should the limits be set? These are the unsolved yet fundamental questions for breast surgery in the next few years.

The benefits of training a skilled surgeon competent in all oncological and aesthetic procedures of the breast has many obvious advantages. This skilled surgeon might have a background in plastic or breast surgery with the additional training making him or her a surgeon with both competencies. This paradigm has already taken hold in the UK with nine oncoplastic fellowships available to plastic and breast surgeons. Australia also has a number of these fellowships available. Brazil is training breast surgeons in oncoplasty and is beginning to set the standards that a mastologist (breast surgeon) must meet in order to qualify as a specialist in breast surgery. The European Union has some programmes leading to a certificate in OPS. The US has lagged the rest of the world in embracing this new specialty and in establishing programmes leading to proficiency in OPS. Despite scores of breast fellowships available to general surgeons leading to a specialisation in breast disease and cancer, with additional exposure to radiation and medical oncology, radiology, psychiatry, plastic surgery, genetics and nutrition, most fellowship trained US breast surgeons cannot perform basic mammoplasties or use glandular flaps for breast reshaping. They have even less competence with post-mastectomy reconstruction. Annual courses in oncoplastics by the American Society of Breast Surgeons and the American Society of Breast Disease are encouraging, but the utility of a weekend course in creating a new paradigm for breast surgery must be questioned. In the US, politics and turf battles may delay the creation of this new specialty but ultimately the public will demand what is in their best interest.

This fragmented approach in terms of breast cancer surgery, in times of such major advancements in the understanding of the molecular underpinnings of the disease and more sophisticated and efficacious plastic and reconstructive surgery options seems illogical and certainly interferes with the ultimate goal of translating these new technologies into improved quality of life for our patients. Breast reconstruction should be integral to breast cancer treatment for most patients, not an option. How do we mentor these new trainees and for how long? This will depend on the surgical background of the mentee, making it difficult to establish a standard norm. It is more subjective than other surgical disciplines or standard surgical residency training. The learning curve should be individualised for each technique and surgeon, because it does not represent a new specialty, but a surgical refinement of conservative and radical approaches in breast cancer surgery. Mentors should identify technical limits and establish boundaries for their mentees, using a model of levels of competence. Objective variables of technical skills should be based on competency-based training (see *Table 2*).[27] A proposal of a curriculum for OPS is shown in *Table 3*, but there is a lack of a consensus as to which is the ideal one, and it will probably be individualised for different realities and needs.

This is an exciting time for OPS mentoring. New instruments, in addition to the classic ones currently used in theatres, should be created. One of them may be for performance assessment, which could be internet-based, simulating real cases with virtual reality, and another could be telementoring. In the end, OPS will have a profound effect on the way breast cancer surgery is practiced and mentored. The present is a critical period for establishing the framework for training and competence, and grooming future leaders to train the next generation of surgeons to advance the specialty forward. The success of this ambitious undertaking will critically depend on how to mentor this new generation of surgeons. Overall, mentoring must be individualised, ethically based, and committed to present and future patients, mentees and new potential areas for research.

Conclusions

Surgeons play an influential role in the care of the breast cancer patient. They are often the physicians who biopsy and diagnose the breast cancer patient and, if not, most often have the first discussions about therapy after the biopsy results are known. These conversations are not limited to cancer surgery, but often include dialogue about reconstructive surgery, chemotherapy and radiation therapy, and quality of life matters. This required expertise in additional areas is now taught (in a cursory format) in most breast fellowships in different countries. From a surgical perspective, the breast surgeon plays a key role. The decision to downsize a tumour with neoadjuvant chemotherapy requires an understanding of tumour biology, cancer surgery and aesthetic breast surgery. The discussion regarding BCT versus mastectomy requires a good understanding of the aesthetic quality of the breast that will be left behind after a partial mastectomy, versus possibly an improved result with mastectomy and reconstruction. The most challenging lumpectomies often require plastic surgery expertise. The potential quality of post-mastectomy reconstruction requires an understanding of which patients might be better served with tissue flaps versus expanders or definitive implants.

Finally, we believe that all breast surgery today should conceptually be 'oncoplastic surgery', where oncological principles and aesthetic considerations are both taken into account to obtain the optimal oncological and aesthetic outcome. This is an ideal that we should strive to obtain but, admittedly, will be difficult to accomplish. This will require a new training paradigm for the next generation of breast and plastic surgeons and the retraining of older surgeons. The logistics of this training will be complicated by 'turf battles' between plastic surgeons, general and breast surgeons. Questions regarding credentialling, training and medical legal matters will have to be addressed on international and national levels. None of these concerns has anything to do with the welfare of the patient. Regardless of these obstacles, however, this new expertise will result in a higher standard of care for all breast patients and will, undoubtedly, be something that patients will demand of their surgeons. ■

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