



The development of oncoplastic breast surgery in the UK

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Abstract: UK breast services have changed beyond recognition in 3 decades, improving standards of care and optimising results. Breast surgery has transformed from being a somewhat unattractive subspecialty activity of general surgeons to one of the most popular career options of young surgical trainees today. The variety of surgical techniques available has escalated enormously, with many new oncoplastic (OP) procedures now provided free of charge by the National Health Service. General surgeons subspecialising in breast surgery are now expected to acquire a range of reconstructive skills, while plastic surgeons subspecialising in breast reconstruction must demonstrate competence in the oncological principles and surgical aspects of breast cancer management. Inter-speciality training has been the key factor behind the acquisition of these new skills, in a programme backed up by new national audits, prospective cohort studies and guidelines. These activities are providing valuable data to inform the future configuration of OP surgery—which for many will inevitably result in a ‘stand alone’ specialty of OP breast surgery. In future, a range of developments will be needed to secure the viability and affordability of OP breast surgery. More objective decision-making tools are being developed to inform case and technique selection, together with standardised methods to measure clinical, aesthetic and patient-reported outcomes. The escalating costs of these procedures will need to be justified, backed up by the growing popularity and the oncological safety of OP conservation techniques that also avoid both the risks and the expense of implant-based and more major autologous procedures.

Keywords: Oncoplastic surgery; training; specialisation; curriculum; skills

Received: 17 May 2021; Accepted: 16 August 2021; Published: 30 December 2022.

doi: 10.21037/abs-21-75

View this article at: <https://dx.doi.org/10.21037/abs-21-75>

Introduction

Until recently, breast surgery offered limited choices for breast cancer patients, as well as few technical challenges for the surgeons responsible for their care. Fifty years ago, there were only 3 options—mastectomy, lumpectomy, and axillary clearance. Since then, a range of public, professional, political and patient-led factors have driven the transformation of breast surgery from what many general surgeons regarded as a ‘sinecure’, into a highly sophisticated field of modern surgical practice.

The wide range of oncoplastic (OP) procedures that can avoid the need for mastectomy today is perhaps the most dramatic example of this transformation, which is revolutionizing the treatment of patients worldwide. Several

key inter-related developments have been responsible for the phenomenal rise of OP surgery in the UK, some of which inform strategic planning in other health systems.

The emerging breast specialist

In 1988, Breast Screening was launched in the UK, leading to the emergence of a new group of breast specialists. This embryonic group was a popular development, and it attracted committed breast specialists who implemented a range of new clinical practice guidelines. A quality improvement framework was agreed, underpinning the recognition of specialised breast units. Inevitably, this process resulted in a growing cohort of surgeons with specialist skills, who were losing their traditional general

surgical skills. These were being replaced by new OP skills, backed up by OP guidelines describing options and outcomes, and establishing a new set of standards (1).

Public demand

Greater interest in OP surgery fuelled an increased demand for these procedures over the next decade. At the same time, new guidelines encouraged patients to request immediate reconstruction during mastectomy or partial mastectomy (2). But although OP surgery was poised on the threshold of a major expansion, there were too few surgeons in the UK who were able to offer these new skills.

An unexpected crisis in breast training

Twenty-five years ago, most trainees in general surgery expressed little interest in a career as a breast surgeon. Routine procedures offered little operative challenge or satisfaction, and consultations were perceived as being stressful (3). European employment law greatly restricted the exposure of trainees to essential surgical experience, preventing the development of a range of skills in the very foreshortened timeframe allowed. Eighty percent of those trainees choosing breast surgery prioritised skills in breast reconstruction.

Three coordinated steps were taken by the leaders in breast surgery and the Royal College of Surgeons of England (RCSE) to avoid a major shortage of breast surgeons. Almost by chance this accelerated the emergence of OP specialists in the UK.

- ❖ First, a new sub-speciality Breast Curriculum was developed, and this was endorsed by the statutory bodies responsible for standards in training and clinical practice. Newly qualified breast surgeons would now receive training in a broad range of OP techniques, enabling them to integrate these into their surgical practice. This was a ‘world first’, and was regarded as an exemplar for others developing breast services.
- ❖ Second, the Association of Breast Surgery (ABS) collaborated with the RCSE to launch a new national programme teaching OP techniques in the RCSE’s London-based skills laboratories. Courses were designed for consultants and trainees with different levels of experience. A range of synthetic models (for example, to demonstrate and practice Level 2 mammoplasty procedures), and cadaver models (to

demonstrate and practice flap and implant-based procedures) have been developed and updated to reflect changing trends over the last 25 years. These courses are now available in teaching laboratories across the country and overseas, and continue to attract participants from the UK and around the world.

- ❖ Lastly, a new inter-specialty training group was set up in 2000 between the ABS and the British Association of Plastic, Reconstructive and Aesthetic Surgery (BAPRAS) at the RCSE. The group supported the new concept of a ‘stem breast surgeon’—a trainee from a background of breast or plastic surgery. The training curricula would be transformed to enable both groups to acquire oncological skills in tumour resection, and in reconstruction. Members of this new Training Interface Group (TIG) supported 3 key outcomes:
 - ♦ Improvement of service to patients by facilitating interface training;
 - ♦ Development of cross-speciality training for registrars and consultants;
 - ♦ Ultimately, the provision of training for more junior surgeons.

The success of the cross-specialty training initiative

Breast surgery was becoming less popular at a time when the demand for specialist breast surgeons was rising, and women were becoming increasingly informed about the availability of breast reconstruction. The Department of Health (DoH) was increasingly concerned about the shortage of trainees in breast surgery, and was searching for ways to accelerate recruitment. A proposal to develop a National Oncoplastic Fellowship scheme was submitted to the DoH by the TIG, at an annual cost of £0.5 million. Following a competitive application process, 9 OP units were selected as training centres (increasing to 12 in 2014). Competition was intense, and the criteria for unit selection included a large and diverse workload of OP procedures, supported by a full multidisciplinary meeting (MDM) and experienced surgeons with a track record for research, audit and training.

Central funding for these fellowships has been maintained for the last 20 years, and today there are >140 fully trained OP fellows in the UK. They personally performed around 100 major procedures while Fellows, and >120 have

secured consultant posts, training the next generation of OP trainees.

Two national projects were launched with the support of the TIG, highlighting the power of cross-specialty collaboration. These included a far-reaching prospective audit of all reconstructions to assess outcomes (4), which informed the development of OP guidelines based on the metrics disclosed by the audit (5). The new guidelines reflected the high number of complications reported, and recommended changes in clinical practice to address these unexpected findings, as well as the marked variation in rates of reconstruction across the country (6). Meanwhile, the expansion in the numbers of OP consultants was leading to better access to skilled services.

Working across boundaries

The level of cooperation between ABS and BAPRAS has fluctuated over the last 20 years, but both organisations have gained considerably by the sharing of each other's knowledge and skills. Inter-specialty referrals have also increased with a greater understanding of the skills and limitations of each group. An innovative online and face-to-face Master's programme launched by the University of East Anglia has increased structured learning to a new level of sophistication, and is open to plastic and breast trainees, and consultants (7). The options and choices for patients have also escalated to a new level, supported by a local and regional referral network that encourages women to discuss their options with the appropriate specialist.

Specialisation in Europe

There is a big variation in the availability and type of specialist performing OP surgery across Europe. Much of this variation is based on traditional models of breast cancer care—provided by gynaecologists in some countries, and surgical oncologists or breast surgeons in others. In many countries such as Italy, Spain and Sweden, all breast reconstruction after mastectomy have been performed traditionally by plastic surgeons. But recently, breast surgeons throughout Europe are beginning to extend their skill-base to include immediate implant-based reconstruction and Level 1 and Level 2 breast-conserving procedures. This development is generally supported by their plastic surgical colleagues, who perform the more complex autologous pedicled and free flap reconstructions as immediate, delayed or salvage procedures. This

development has been supported by the European Society of Mastology (EUSOMA) with the introduction of a successful framework of certification to audit and accredit breast services, including breast reconstruction.

The first guidelines detailing the standards required for breast units were published by EUSOMA in 2000 (8), and a second iteration in 2007 focused on the training of all specialties contributing to the multidisciplinary team, including those surgeons performing reconstruction (9). The original guidelines were updated in 2013 (10) and in 2020 (11), to keep in step with this rapidly changing field. By 2021, more than 40 centres in 9 European countries and 2 in China have been accredited, with a steady increase in applications.

The European Union of Medical Specialists formally recognized breast surgery as a subspecialty interest with the introduction of a framework of examinations assessing knowledge skills and aptitude, leading to a Specialist Certificate in Breast Surgery (12). This qualification is favoured by many employers, and is improving standards of practice including OP surgery right across Europe.

What's happening today?

The impact of changing the curriculum to include reconstruction 2 decades ago continues to improve access to OP surgery today. General surgeons with an interest in breast surgery are still required to be 'emergency safe' (13), restricting the time to gain more advanced reconstructive skills such as autologous flap techniques. Most newly appointed consultants today have a portfolio of skills restricted to implant reconstruction, and OP breast conserving surgery. From August 2021, breast trainees will be able to choose a new curriculum (14). This will enable them acquire skills in a wider range of OP techniques, without any emergency or elective commitments to general surgery—a significant step on the way to developing a new specialty of breast surgery.

Implant reconstruction is an increasingly attractive choice for patients who want to avoid the greater risk, longer hospital stays and convalescence of more complicated techniques. Surgeons are also drawn by the simplicity, low complication rate and early discharge of these patients, and hospitals are attracted by the short stay and the potential for a higher case volume. Implant reconstruction was accelerated by the development of acellular dermal matrices (ADM)s, which were originally draped over the lower pole and more recently, over the whole implant. By

2014, implant-based techniques had increased, accounting for more than half of all reconstructions carried out in the UK (15), and rising to 80% in the United States by 2016 (16). This major shift in US practice was driven in part by the higher hourly reimbursement rates received by surgeons performing implant reconstruction, compared with flap-based techniques (17).

There are several reasons for the increasing concerns now emerging over this paradigm shift. Up until recently, autologous flaps were the ‘gold standard’ technique with predictable outcomes and durable long-term results, maturing with the patient up to and beyond 20 years (18–20). Today, autologous flaps provide an important option for patients who want to minimize the adverse effects of post-mastectomy radiotherapy after immediate reconstruction. By contrast, the longer-term performance of implants combined with ADMs is eagerly awaited. But there are early indications that unplanned revisions and complications increase almost exponentially over time (21).

Tomorrow’s challenges

Patients, clinicians and health services are facing new challenges as OP techniques become embedded into clinical practice.

More objective decision-making tools

New tools are emerging that promise the ability to identify those patients who will gain the most benefit from an OP approach to breast conservation. ‘Core datasets’ can identify these patients [e.g., BCCT.core (22)] and more sophisticated tools such as magnetic resonance imaging (MRI) elastography and 3D photography are under development. The PICTURE™ project (23) uses software to ‘fuse’ an individual patient’s data, generated from multiple sources to create an ‘avatar’ of post-operative appearance. Images of predicted appearance following straightforward breast-conserving surgery can be viewed, helping patients to decide whether they wish to undergo more complex surgery with the attendant risks to avoid deformity. This approach will help to transform decision-making from an exercise based on subjective opinions and advice, to a more objective, evidence-based process.

A need for better outcome data

A raft of new OP techniques is developing without

any high quality, mature data to inform patient choice. Examples include the rising use of a range of perforator flaps for volume replacement, and immediate prepectoral reconstruction using subcutaneous meshes after total mastectomy. Moreover, most publications report opinions based on small retrospective personal case series, systematic reviews, or the opinions of experts (Level 3–5 evidence). A recent large systematic review concluded ‘at present the breast reconstruction outcome literature is inconsistent, and lacks methodological rigor... a core outcome dataset is strongly recommended’ (24).

This lack of good objective data has been tackled through a number of UK initiatives. A large scale national audit of mastectomy and reconstruction investigated clinical and patient-reported outcomes, disclosing significant differences between implant and autologous techniques (4). This finding correlated with the findings of a national database of operative outcomes (HES—the Hospital Episode Statistics Database) showing a reduced need for surgical revisions after autologous when compared with implant-based procedures (25). Other studies have confirmed these findings, which are somewhat concerning in view of the rising popularity of implant reconstruction. These include a prospective study of >2,000 patients following immediate implant reconstruction in >80 centres—the UK iBRA study (26). This study has confirmed the high complication rate after implant techniques, with almost 1 in 5 patients requiring unplanned interventions by 3 months.

It remains to be seen whether these findings will gradually turn the tide against implant reconstruction, in spite of the strong personal, organisational and financial drivers that are leading to an almost exponential increase in their use. There is a real need to present choices to patients, backed up by the expanding body of data highlighting the pros and cons of different options.

Cost-containment and new ways of working

Increasing the number of choices and technical developments in a nascent specialty will inevitably lead to escalating costs. The trend for a contralateral mastectomy to reduce risk in women presenting with a new cancer is a good example, with the majority of these patients in the US combining this with immediate reconstruction (16). The effectiveness of bilateral risk-reducing mastectomy in high-risk individuals is also changing practice in the US (27), Europe (28) and other parts of the world (29). But this approach comes at a price—at least £15,000 for

the initial procedure when combined with immediate reconstruction (30). Chemoprevention using anti-oestrogens with or without surgical oophorectomy is considerably cheaper, but remains an unpopular choice. In future, public health services will face difficult decisions about the affordability of different approaches, based on their cost-effectiveness. Measures may include the cost per quality adjusted life year (QALY), comparing all risk-reducing options. Evidence of the cost-effectiveness of breast-conserving OP surgery—by avoiding the costs and risks of mastectomy/reconstruction—is also badly needed. Already, some health authorities in the UK are limiting funding for OP surgery to two procedures.

Close working relationships between breast and plastic surgeons are vital. Cross-specialty collaboration has been built up over the last 20 years through joint initiatives, such as fellowships (31), an Oncoplastic Mastership programme (7), major clinical audits (4,26), and joint guidelines for oncoplastic practice (5). In spite of these efforts to promote integration, much remains to be done. An innovative training programme in the UK has enabled breast surgeons to extend their OP skill-base over the last decade, with the majority requesting further training. On the other hand, plastic surgeons have gained few additional skills during this period, with only a minority favouring more training (32). This signals a future where most OP surgery including OP conservation and implant reconstruction will be carried out by breast surgeons. Plastic surgeons are likely to focus on developing microvascular skills to provide free-flap services for primary reconstruction and for salvage.

Avoiding mastectomy by extending the availability of OP conservation

OP conservation techniques help to avoid most of the early and subsequent problems following implant-based approaches, such as early and delayed infection, capsular distortion and pain, implant loss and repeated operations for cosmetic failure. The UK has seen a 6-fold increase in the use of these techniques, rising from 1–6% between 2000–2014 (33). Their use is increasing in step with confidence in ‘extreme OP conservation’ techniques—used to resect more advanced tumours normally treated by mastectomy (34,35). The more widespread use of neoadjuvant therapy is also reinforcing this trend.

After years of discussion and debate, an agreement has finally been reached with the UK Training Committee for General Surgery. A new curriculum will allow breast

trainees to focus exclusively on breast disease during their final 2 years, acquiring advanced oncological and OP skills (14). This important decision will encourage more trainees to opt for a career in breast surgery, and will provide them with a new range of skills such as the mastectomy-avoiding procedures referred to above.

Conclusions

OP surgery is now freely available in the UK, as a result of many new initiatives. One of the most effective developments has been the commitment to cross-specialty training, driven by a small group of enthusiasts. Repeated attempts to establish a generic ‘stem breast surgeon’ from a background of either breast or plastic surgery have been unsuccessful, mainly because of failed attempts to secure approval by the UK General Medical Council for a new specialty of OP breast surgery. As a result, breast surgeons are performing most of the OP breast-conserving surgery and implant procedures, with plastic surgeons deploying their microsurgical skills (32).

This situation has emerged alongside the development of breast surgery as a mono-specialty. Older surgeons have given up General Surgery, and younger surgeons abandon these skills as soon as they have secured a consultant appointment with no on call commitment. Plastic surgeons have to retain a wide range of general plastic skills to enable them to provide an elective and ‘on call’ emergency service, and they are in short supply. This limits time for OP practice, even for those with appropriate training and skills. As a result, much of their work today is devoted to primary autologous reconstruction and to salvaging failed implant reconstructions.

Patients in the UK today are fortunate to enjoy a world-class OP service. We hope that our experience will provide a useful roadmap for others setting out on this journey. The most important ingredient has been the longstanding support and commitment of breast and plastic surgeons, enabling the service to thrive and respond to future challenges.

Acknowledgments

Funding: None.

Footnote

Peer Review File: Available at <https://abs.amegroups.com/>

[article/view/10.21037/abs-21-75/prf](https://doi.org/10.21037/abs-21-75/prf)

Conflicts of Interest: The author has completed the ICMJE uniform disclosure form (available at <https://abs.amegroups.com/article/view/10.21037/abs-21-75/coif>). The author has no conflicts of interest to declare.

Ethical Statement: The author is 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.

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doi: 10.21037/abs-21-75

Cite this article as: Rainsbury RM. The development of oncoplastic breast surgery in the UK. *Ann Breast Surg* 2022;6:36.