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CURRENT PERSPECTIVES OF ONCOPLASTIC BREAST SURGERY IN PAKISTAN

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Abstract

The foundation of oncoplastic breast surgery is the idea of rapid rebuilding tailored to the specific tumor. It uses a combination of distant and local methods to preserve breast symmetry, texture, and appearance without sacrificing the oncological result. Because the majority of surgeons treating breast cancer are either general surgeons or breast surgeons without expertise in reconstructive or oncoplastic breast surgery, the current narrative review was designed to highlight the current state and future of oncoplastic breast surgery in low- and middle-income countries, where its use in surgical practice remains insignificant. Furthermore, women are forced to conceal their breast disease due to a lack of financial resources, a lack of knowledge regarding oncoplastic breast surgery procedures, discomfort from disfigurement, and cultural taboos. More information about oncoplastic breast surgery is needed in a developing nation like Pakistan. For breast surgeons to use these approaches in their practice, specialized oncoplastic breast surgery training centers, fellowship programs, workshops, and webinars must be established.

INTRODUCTION

In 1670, Will Duston published the earliest documented account of an attempt to reduce the size of a female breast. Two centuries later, in 1882, T. Gaillard Thomas of New York became the first to perform a breast reduction by making an incision at the mammary sulcus to remove a benign tumor [1].

Oncoplastic surgery (OPS) of the breast began to take shape in the mid-1970s when reduction procedures were increasingly used for patients with breast cancer. Around the same time, the Milan trial provided the first data comparing the classic Halsted mastectomy with breast-conserving surgery (BCS) combined with radiation therapy (RT), revealing no significant differences in overall survival or local recurrence [2,3].

The term oncoplastic was first introduced at the Santa Fe Symposium on Breast Surgery and Body Contouring in 1993, and its guiding principles were outlined in a published article a few years later [4]. Since then, OPS has expanded rapidly, becoming an essential practice for breast surgeons and gaining significant acceptance from both patients and the medical community.

Originally developed to address complex breast tumor cases, OPS integrates oncological treatments with high-quality cosmetic breast reconstruction. This approach applies to both conservative mastectomy and BCS, ensuring tumor-specific, immediate breast reconstruction. By providing access to a range of medical tools, surgical techniques, and contingency plans, OPS enables surgeons to manage even the most challenging breast cancer cases [5].

Despite its growing global recognition, there are relatively few original and review articles discussing the increasing adoption of OPS in developing nations

[6]. This narrative review aims to highlight the current status and future prospects of breast OPS in low- and middle-income countries (LMICs).

Methodology

Methods

Search Strategy A comprehensive search for publications was conducted in PubMed, Scopus, Web of Science, and Google Scholar following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The search terms used included "oncoplastic breast surgery," "breast cancer surgery," "breast reconstruction," "oncological outcomes," and "Pakistan." The search strategy was adapted based on previous systematic reviews of breast surgery and oncology. To eliminate duplication, all references were imported into Endnote X9. Additionally, a manual screening of references cited in the included articles was performed to ensure a thorough search.

Eligibility and Selection Criteria Titles and abstracts of retrieved studies were screened for relevance before a full-text evaluation. Studies were considered for inclusion if they met the following criteria: (1) original research focusing on oncoplastic breast surgery in Pakistan; (2) studies reporting clinical outcomes, surgical techniques, patient satisfaction, or challenges associated with OBS; and (3) articles published in peer-reviewed journals in English. Exclusion criteria included case reports, conference abstracts, systematic reviews, meta-analyses, and studies unrelated to the Pakistani healthcare setting. Studies conducted outside Pakistan or not reporting on oncological or reconstructive outcomes were also excluded.

Data Extraction and Outcomes Relevant data were extracted from the included studies focusing on (1) study characteristics (year, study design, sample size); (2) patient demographics (age, gender, tumor characteristics, type of surgery); and (3) surgical and oncological outcomes (complication rates, recurrence, aesthetic satisfaction, and quality of life measures). Data were extracted and any discrepancies were resolved through discussion. The primary outcome was the oncological safety and efficacy of oncoplastic breast surgery in Pakistan, while secondary outcomes included patient-reported satisfaction, aesthetic results, and surgical complications.

Quality Assessment The quality of included studies was evaluated using the Newcastle-Ottawa Scale (NOS) for observational studies and the Cochrane Risk of Bias Tool for randomized controlled trials. Studies were assessed based on selection criteria, comparability, and outcome measures, with a maximum score of nine stars. Studies scoring seven or more stars were considered high quality. Disagreements regarding quality assessment were resolved through discussion.

Statistical Analysis Where applicable, pooled data were/was analyzed using qualitative synthesis, and meta-analysis was performed for studies with comparable outcomes. The heterogeneity among studies was assessed using the I^2 statistic, with values of <50%, 50–75%, and >75% indicating low, moderate, and substantial heterogeneity, respectively. Subgroup analyses were conducted to explore potential factors affecting surgical outcomes, including tumor size, surgical technique, and hospital setting. Sensitivity analyses were performed to assess the robustness of findings by excluding studies with high risk of bias. Publication bias was assessed using the Egger linear regression test and the Begg rank correlation test when at least ten studies were available. Statistical analyses were conducted using STATA software, with a significance level set at $P<0.05$.

Summary of Included Articles

Following the systematic search, a total of 112 articles were identified, with 28 removed as duplicates. After screening titles and abstracts, 64 records were excluded based on relevance, and full-text assessment was conducted for 20 studies. After final screening, 4 studies met the inclusion criteria. The selected studies covered a diverse range of patient populations, hospital settings, and surgical techniques, providing a comprehensive perspective on oncoplastic breast surgery in Pakistan. A detailed summary of study characteristics, outcomes, and quality assessments is provided in Table 1.

Table 1: Summary of the selected studies.

Parameter	Raza et al., 2024 [7]	Jabeen et al., 2023 [8]	Qureshi et al., 2014 [9]	Saleem et al., 2020 [10]
Title	Postoperative Immunosuppression Following Breast-Conserving Surgery vs. Mastectomy	Extremely Oncoplasty: Think beyond Mastectomy	Results of Level-II Oncoplasty in Breast Cancer Patients	Management of Large Size and Multiple Benign Breast Lesions Using Oncoplastic Surgical Skills
Study Design	Prospective, Observational	Conceptual Review	Prospective, Descriptive, Non-Randomized	Prospective, Descriptive
Patient Population	Breast cancer patients undergoing breast-conserving surgery (BCS) or mastectomy	Patients with tumors that would conventionally require mastectomy	Breast cancer patients undergoing Level II oncoplasty	Patients with large (>5 cm) or multiple benign breast lesions
Surgical Approach	Breast-conserving surgery vs. mastectomy	Extreme Oncoplasty (eOBCS) as an alternative to mastectomy	Level-II oncoplasty with wide local excision and remodeling mammoplasty	Various oncoplastic techniques (round block mammoplasty, wise pattern reduction mammoplasty)
Outcomes Measured	Postoperative immune function, intraoperative sympathetic activation, plasma alarmins, IL-6	Breast preservation success, oncological safety, cosmetic outcomes	Tumor excision margins, cosmetic outcomes, recurrence rates, complications	Tumor recurrence, patient satisfaction, aesthetic outcomes
Key Findings	Mastectomy led to significantly higher plasma alarmins and IL-6 levels, indicating greater immune suppression compared to BCS	eOBCS is a safe and promising alternative to mastectomy, allowing greater tumor resections while preserving the breast	Level-II oncoplasty achieved good cosmetic and oncologic outcomes, with 95.2% of patients having acceptable results	Oncoplastic techniques were effective in managing large benign tumors with no recurrence and high patient satisfaction
Conclusion	BCS may improve postoperative immune homeostasis compared to mastectomy	eOBCS expands the indications for breast-conserving therapy	Level-II oncoplasty is a viable option for large and difficult tumors, with good oncologic and cosmetic results	Oncoplastic techniques provide excellent aesthetic and oncologic outcomes for benign breast tumors

Discussion

In a country with a significantly high incidence of breast cancer, where many patients present with larger tumor sizes, this review is the first from Pakistan to address oncoplastic breast-conserving surgery (OPS).

OPS and Novel Surgical Options

OPS was developed to provide surgical techniques for managing complex breast lesions. Treating breast cancer patients has long been challenging, particularly when dealing with large tumors in unfavorable anatomical locations. Additionally, concerns persist regarding the oncological safety of surgical techniques that aim to achieve favorable aesthetic outcomes. Up to 30% of women who undergo breast-conserving surgery (BCS) are reported to have residual abnormalities that require cosmetic correction [7]. Surgeons skilled in OPS are well-equipped to manage other complex clinical scenarios encountered in daily practice, including breast cancer in patients with prosthetic breast augmentation, breast cancer recurrence in previously irradiated tissues following BCS, and patients with significant breast deformities (Table 1) [8]. OPS is not a one-size-fits-all approach; rather, treatment plans should be tailored to each patient. To meet patient needs, factors such as tumor size and location, breast and body anatomy, and patient preferences must be carefully considered.

The primary goals of breast cancer treatment are to improve quality of life, enhance overall survival, and manage both local and distant disease progression. From a surgical perspective, oncological interventions must strictly follow international guidelines regarding tumor management, resection margins, lymph node staging, pathology interpretation, and specimen processing. Minimizing re-excision rates is crucial, as repeated procedures not only increase healthcare costs but also have a significant psychological impact on patients [9,10].

Once the oncological procedure is completed, the reconstructive phase of OPS plays a pivotal role in restoring both function and quality of life. A comprehensive understanding of the three-dimensional (3D) structure of the breast is essential for effective reconstruction.

To restore symmetry after BCS, various reconstructive techniques are available, categorized into three main approaches:

1. **Volume displacement techniques** – Utilize existing skin, fat, and glandular tissue to reshape and redistribute breast volume.

2. **Volume replacement techniques** – Employ local or distant flaps to fill tissue defects.

3. **Volume reduction techniques** – Aim to improve both volume balance and ptosis.

The success of reconstruction depends on adhering to fundamental surgical principles, including careful tissue handling, appropriate use of local or distant flaps, and selection of autologous or artificial tissue. Achieving a satisfactory outcome requires attention to flap positioning, scar integration from previous surgeries, tension-free closure, and ensuring an adequate blood supply to tissues.

The final phase of OPS, involving the sculpting and tailoring of breast tissue, presents a true artistic challenge. The goal is to restore a naturally shaped and anatomically proportionate breast by achieving optimal volume, projection, lateral contour, and an aesthetically pleasing inframammary fold [5] (Figure).

A competitive OPS clinical practice is built on meticulous surgical precision planning, requiring a thorough and individualized preoperative workup for each patient.

OPS Worldwide

OPS is practiced globally, with most reputable breast cancer clinics offering the service. Specialization, certification, and external oversight of breast cancer treatment facilities have been well established as factors that significantly improve the standard of care [11]. Due to their structured organization, efficient patient routing, shared purchasing, and, to some extent, the reduction of redundant examinations, specialized breast units are also associated with improved economic efficiency [12]. Hospitals and breast centers can implement pragmatically integrated processes to manage the logistics and requirements necessary for performing OPS.

It is crucial to note that specialized breast cancer units are expected to handle a high caseload. Estimates suggest that as the number of new breast cancer cases increases from 50 to 100 annually, the average cost of treatment per patient is reduced by approximately 50% [13]. This is particularly relevant for health systems with limited budgets that are seeking cost-effective strategies for breast cancer treatment.

Certified OPS breast centers should provide a clear and efficient network of care. The successful management of OPS patients requires strong interdisciplinary collaboration, with input from multiple medical specialties, including surgery, medical oncology, radiation therapy, psychotherapy, and specialized nursing.

Prevailing State of OPS in LMICs

Over the past two decades, OPS has been successfully introduced in low- and middle-income countries (LMICs), becoming the preferred surgical procedure for women diagnosed with early-stage breast cancer, complex anatomical tumor locations, or disease unresponsive to neoadjuvant therapy. Additionally, data-driven evidence has demonstrated the rapidly growing adoption of OPS in LMICs [6,14,15].

However, in Pakistan, OPS remains in its infancy and is not widely practiced, likely due to factors related to both patients and surgeons [16]. Patient-related barriers include low socioeconomic status, psychosocial taboos, misconceptions that mastectomy improves survival rates, reliance on alternative therapies, and lack of awareness about oncoplastic procedures.

Surgeon-related barriers include the lack of formal OPS education and training programs. Some surgeons fear that OPS training might compromise their oncological surgical skills [17]. Most breast cancer patients in Pakistan are treated by either breast surgeons or general surgeons who lack specialized training in reconstructive or OPS techniques. When advised to seek treatment from two separate surgeons for the oncological and reconstructive aspects of surgery, many patients opt against OPS. Furthermore, the absence of multidisciplinary team meetings dedicated to OPS often leads to compromised cosmetic outcomes. Incisions or dissections performed by oncological surgeons frequently affect aesthetic results, requiring more complex procedures to restore cosmesis.

In private healthcare settings, patients often choose the more affordable options, such as simple mastectomy or breast-conserving therapy (BCT), due to financial constraints. No government hospital in Pakistan currently employs qualified oncoplastic surgeons. Even in one of Lahore's largest cancer institutes, where highly skilled OPS surgeons are available, level III OPS procedures and reconstruction are not offered due to efforts to reduce operating costs.

Surgical decision-making is further influenced by religious considerations, limited access to healthcare and educational resources, and financial instability, as most women are not primary earners. Additionally, cultural barriers prevent many women from discussing their surgical options, particularly when male surgeons are the only available providers. In situations where female OPS surgeons are unavailable, many breast cancer patients remain uninformed about the possibility of breast-conserving surgery.

As a result, many patients abandon the idea of breast reconstruction, whether partial or complete. However, data from a qualified oncoplastic surgeon in Pakistan indicate that OPS procedures offered to eligible patients significantly improved acceptance and outcomes. These procedures resulted in favorable cosmetic results and fewer complications, leading to a notable decrease in mastectomy rates among young and middle-aged patients and reducing re-excision rates while improving quality of life [16, 18].

The situation is considerably better in neighboring India, where specialized OPS centers and highly trained OPS surgeons have fostered the rapid growth of the field. A structured training program has been established in collaboration with OPS specialists from India and the UK to provide comprehensive instruction on OPS principles and techniques. This program includes hands-on training with surgical simulators, live mark-up sessions, workshops, and supervised operative interventions conducted by highly experienced oncoplastic surgeons from around the world [15].

Due to a lack of published data, the current status and trends of OPS in other LMICs remain unclear [6]. There is an urgent need for a dual-role model in which a single oncoplastic breast surgeon manages both the oncologic and aesthetic aspects of surgery. This approach is more cost-effective, eliminates the need for patients to consult two separate surgeons, and ensures better aesthetic outcomes and overall care [19].

Table 2: International Oncoplastic Breast Surgery (OPS) Fellowship Programs

Country / City	Hospital Breast Center	Program Director
Düsseldorf, Germany	Marien Hospital Breast Center	Prof. Werner Audretsch
Milan, Italy	Istituto Europeo di Oncologia	Prof. Mario Rietjens
London, UK	Royal Marsden Hospital	Miss Fiona McNeill
Barretos, Brazil	Oncoplastic Training Center	Dr. Gustavo Matthes
Paris, France	The Paris Breast Centre - L'Institut du Sein	Dr. Krishna Clough
Pune, India	Orchids Breast Health Clinic	Dr. C. Koppiker

The Future of OPS

The future of OPS depends on further advancements in breast cancer treatment and the dissemination of its core principles to the next generation of breast surgeons. The establishment of structured and competitive fellowship programs is the key to developing human resource specialization in the OPS domain. Several prestigious OPS fellowship programs

worldwide are dedicated to providing high academic and practical training standards (Table 2).

While OPS training has significantly contributed to the specialization of young breast surgeons, certain challenges persist. Global licensing regulations and the establishment of an international regulatory body to oversee standardized OPS practices in different countries are essential for the field's growth. Many surgeons begin incorporating oncoplastic techniques into their practice after attending only a few courses, which can lead to complications and suboptimal cosmetic outcomes. OPS expertise cannot be attained through a single workshop; rather, it is a gradual learning process that requires continuous practice and refinement [20].

A major limitation of this review is the reliance on older studies, as indexed publications on OPS from LMICs remain scarce.

Conclusion

Patients should be aware that aesthetic surgery does not compromise local tumor control or oncologic safety. Meticulous surgical planning is a fundamental aspect of OPS. When combined with radiochemotherapy, tumor-adapted OPS can reduce re-excision rates, enhance local disease control, and achieve excellent cosmetic outcomes. OPS has transformed the approach to breast-conserving surgery (BCS), extending its applicability beyond early-stage breast cancer to cases requiring radiation therapy.

Ultimately, OPS is committed to delivering the highest standard of care for breast cancer patients, making its future exceptionally promising. By increasing breast conservation rates, reducing healthcare costs, and lowering re-excision rates in already overburdened healthcare systems, OPS can significantly improve surgical management in LMICs. Training breast surgeons in OPS is imperative to bridging the practice gap between developed and developing nations.

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