

Original Research Article

Evolution of breast reconstruction in a tertiary care hospital in Mexico

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ABSTRACT

Background: This study was performed to analyze the trends in breast reconstruction techniques over time, focusing on their evolution and comparing them with findings from previous studies.

Methods: This retrospective study analyzed breast reconstruction procedures performed at the Plastic Surgery Department of the General Hospital of Mexico from January 2019 to December 2023. A total of 105 patients were included, focusing on patient demographics, procedure types, common histological subtypes, observed complications and trends in reconstruction techniques within the hospital and nationally.

Results: The study included 105 patients with a mean age of 49 years, the 41–50 age group being the most prevalent (38.1%). A total of 105 reconstructive procedures were performed: latissimus dorsi flap in 69 patients (65.7%), TRAM flap in 21 patients (20%) and DIEP flap in 7 patients (6.7%). For alloplastic reconstructions, tissue expanders were used in 38 cases (36.2%) and implants in 36 cases (34.3%). Most patients (81.9%) had no complications; necrosis was the most common complication (6.7%). Radiotherapy was administered to 43 patients (41%), while 68 patients (64.8%) underwent chemotherapy. The most common oncological cause was ductal carcinoma (65.7%).

Conclusions: Breast reconstruction at the General Hospital of Mexico has evolved toward safer and more effective procedures, tailored to the specific needs of each patient. The use of alloplastic methods and latissimus dorsi flaps predominates, reflecting global trends in breast reconstruction and highlighting progress in local surgical practices.

Keywords: Breast cancer, Breast reconstruction, DIEP, Latissimus dorsi flap, TRAM

INTRODUCTION

Breast reconstruction has significantly evolved over the years, influenced by surgical advancements and changes in the perception of breast cancer treatment. Initially, this technique was not widely accepted due to concerns about masking tumor recurrences after mastectomy. However, since the mid-20th century, it has gained acceptance and has become an integral part of oncological treatment. The first autologous muscle flap used for breast reconstruction was the latissimus dorsi myocutaneous flap, described by Tansini et al in 1896. Subsequently, techniques such as the transverse rectus abdominis myocutaneous (TRAM) flap, developed by Hartrampf et al and the deep inferior epigastric perforator (DIEP) flap by Allen et al, have provided excellent reconstructive options.¹ In the field of

implants, Vincenz Czerny performed the first attempt at breast enhancement in 1895 by implanting a lumbar lipoma. Later, silicone implants introduced by Thomas Cronin and Frank Gerow in 1961 marked an important milestone, paving the way for current silicone and saline prototypes.¹ Autologous reconstruction has advanced toward microsurgical techniques with free tissue transfer, improving the aesthetic and functional quality of outcomes. In comparison, a study conducted at the General Hospital of Mexico on breast reconstruction patients between 1995 and 2000 reported 92 procedures using autologous tissues (68.1%). These included TRAM reconstructions in 63.7%, with 15.5% being free flaps and 42.2% pedicled flaps. Another 41.5% of reconstructions involved the latissimus dorsi flap.² Patients seeking breast reconstruction after mastectomy are often women who wish to improve their body image and feel complete again.

The primary motivation for many of them is to maintain a balanced appearance and enhance their self-esteem.^{3,4} It has been observed that younger women and those with higher levels of depression are more likely to desire breast reconstruction.⁵ Additionally, patients who receive adequate information about the procedure and the support of their physicians tend to opt for reconstruction.^{6,7}

The perception of feeling less sexually attractive and less feminine after mastectomy also influences their decision to undergo this procedure.⁷ However, there are barriers that may dissuade some women from opting for reconstruction, such as fear of complications, the belief that surgery is not essential for their physical or emotional well-being and concerns about economic costs.^{4,7} Furthermore, racial and socioeconomic disparities may affect both access to and the decision to undergo reconstruction.⁸

The indications for breast reconstruction are varied and depend on multiple clinical and personal factors. According to the medical literature, the main indications include.

Mastectomy for breast cancer

Breast reconstruction is commonly offered to women who have undergone total or partial mastectomy to improve their quality of life and body image.⁹⁻¹¹

Prophylactic mastectomy

Women at high genetic risk of developing breast cancer, such as carriers of BRCA1 or BRCA2 mutations, may opt for prophylactic mastectomy followed by breast reconstruction to reduce their cancer risk.^{12,13}

Adjuvant radiotherapy

In patients requiring post-mastectomy radiotherapy, reconstruction can be performed either immediately or delayed to optimize aesthetic outcomes and minimize complications associated with radiotherapy.¹⁴

Desire to improve symmetry and aesthetics

Breast reconstruction is also indicated to improve symmetry and aesthetic appearance, especially in cases where breast-conserving surgery has resulted in significant deformities or asymmetries.^{10,11}

Poland syndrome

This is a rare anomaly with an incidence of 1 in 7,000, characterized by chest wall hypoplasia and ipsilateral hand abnormalities, making it a frequent cause of breast reconstruction.¹⁵ Regarding the risk factors for complications in breast reconstruction, body mass index (BMI) is thought to have a significant impact.¹⁶ The most common complications in breast reconstruction among

patients who received radiotherapy include wound issues within the first two postoperative years 2.3% in patients without reconstruction, 4.4% in those with implants and 9.5% in those who underwent autologous reconstruction. Infection was diagnosed in 12.7% of patients without reconstruction, 20.5% with implants and 20.7% with autologous reconstruction.

Among 5,219 women who received radiotherapy, no association with infections was found within the first six months, but there was an increased risk of infection between months 7 and 24 in all groups. During this period, radiation was also associated with a higher likelihood of implant removal in patients with implant-based reconstruction and fat necrosis in those with autologous reconstruction.¹⁷

When comparing the incidence of wound complications among immediate, delayed and secondary reconstruction, it was observed that in the group of patients with implant-based reconstruction, surgical site infections occurred in 8.9% for immediate reconstruction, 5.7% for delayed reconstruction and 3.2% for immediate reconstruction without radiotherapy. Similar results were found for non-infectious wound complications. In contrast, infection rates were higher in autologous reconstruction 9.8% for immediate, 13.9% for delayed and 11.6% for secondary.

Additionally, infections and non-infectious complications were more frequent in women who received adjuvant radiotherapy after implant-based reconstruction. Immediate reconstruction complications were associated with a higher number of surgical procedures compared to those without complications.¹⁸ In another study involving 1,473 patients who underwent breast reconstruction, the cumulative incidence at 12 months was 1.4% for seromas, 3.2% for infections, 3.9% for skin flap necrosis, 5.7% for capsular contracture, 7.1% for implant rippling and 3.9% for implant loss.¹⁹

The objective of this study was to analyze and compare different breast reconstruction methods, evaluating their evolution over the years and comparing them with current literature on global trends in breast reconstruction.

METHODS

This descriptive, observational and retrospective study was conducted by accessing the medical records of 105 patients who underwent mastectomy and required intervention by the Plastic and Reconstructive Surgery Department at the General Hospital of Mexico from January 2019 to December 2023. These patients had either immediate or delayed reconstruction.

From an initial total of 151 patients, exclusions were made for the following reasons: unavailability of physical medical records, surgeries performed outside the study's timeframe or patients who declined surgery or were not operated on for other reasons. Variables extracted from the

medical records included age, educational level, number of children, type of reconstruction, radiotherapy, chemotherapy, use of implants or expanders, length of hospital stay, reported complications, histopathological diagnosis, cancer recurrence and donor site morbidity. The data was analyzed using Google Spreadsheets 2024 which was employed for data organization, statistical calculations and graphical representation.

This study follows ethical guidelines for data collection and publication. All patients admitted to the hospital signed informed consent for the use of their medical record data in medical research at the time of admission.

RESULTS

Data were collected from 105 patients aged between 21 and 79 years, with a mean age of 49 years (Table 1). Patients were grouped by age ranges, revealing that the least represented groups were 21–30 years and 71–80 years, each accounting for 2.85% of the sample with only three patients. The 61–70 years group represented 10.5%, while the 31–40 years group accounted for 14.3%. The most represented age range was 41–50 years, contributing 38.1%, followed by the 51–60 years group, which accounted for 31.4% of cases.

A total of 105 reconstructive procedures were performed, with the latissimus dorsi flap being the most commonly used in 69 patients (65.7%). The TRAM flap was used in 21 cases (20%), while the DIEP flap was applied in 7 patients (6.7%). Less frequent procedures included graft harvest and application and direct implant placement, each in one patient (0.95%). Additionally, bilateral latissimus dorsi flap reconstruction was performed in 6 patients (5.7%) (Table 2). For procedures involving alloplastic materials, tissue expanders were the most used, applied in

38 patients (36.2%), followed by implants in 36 cases (34.3%). Meanwhile, 29 patients (27.6%) did not require alloplastic materials and lipoinfiltration was used in 2 patients (1.9%) (Table 3). The majority of patients (86, 81.9%) had no postoperative complications. Among the most frequent complications were necrosis, affecting 7 patients (6.7%) and exposure of alloplastic material, reported in 3 cases (2.9%). Additionally, 2 cases of dehiscence, 2 of infection and 2 of fat necrosis were identified (1.9% each). Less common complications included seroma, hematoma and hernia, each occurring in one case (0.95%).

Regarding donor site morbidity, 103 patients (98.1%) had no complications, although 2 cases (1.9%) exhibited an open wound at the tissue harvest site. In terms of adjuvant treatments, 43 patients (41.0%) received radiotherapy, while 62 (59.0%) did not require it. Chemotherapy was administered to 68 patients (64.8%), while 37 (35.2%) were not treated with this regimen. Cancer recurrence was reported in 2 cases (1.9%), while 101 patients (98.1%) did not experience recurrence. Additionally, 2 patients died due to oncological progression.

When analyzing the statistics for the causes of breast reconstruction, the most common type in our population was ductal carcinoma, representing 65.7% of the total. Of these cases, 23.8% were in situ, 33.3% infiltrative and 7.6% invasive, while only 1% presented metastases. The second most common cause of reconstruction was phyllodes tumor, accounting for 15.2% of the total patients. Lobular carcinoma represented 3.8%, with 2.8% being infiltrative and 1% invasive. Other less frequent causes included papillary carcinoma at 1.9% and both BRCA mutation and hamartoma, each with a frequency of 1%.

Table 1: Distribution of age group.

Age group (in years)	Number of patients	%
21-30	3	2.85
31-40	15	14.30
41-50	40	38.10
51-60	33	31.40
61-70	11	10.50
71-80	3	2.85

Table 2: Distribution of reconstruction methods from 2019-2024, total cases.

Type of reconstruction	Year				
	2019	2020	2021	2022	2023
Latissimus Dorsi	2	2	15	15	35
TRAM	2	2	7	8	2
DIEP	0	1	2	0	4
Skin graft	0	0	0	1	0
Bilateral Latissimus Dorsi	0	0	2	3	1
Direct implant	0	0	1	0	0

Table 3: Distribution of use of alloplastic from 2019-2024.

Type of alloplastic	No. of cases
Implant	36
Expander	38
None	29

DISCUSSION

Microvascular techniques have revolutionized surgery, enabling outcomes previously unattainable without specialized equipment. In breast reconstruction, perforator flaps, such as the deep inferior epigastric artery perforator (DIEP) flap, have achieved success rates as high as 99%, emphasizing their safety and efficacy. These flaps are particularly advantageous for patients with failed implant reconstructions or those requiring radiotherapy.²⁰

Comparing the current findings to a 2001 study by Dr. Haddad, shifts in patient demographics and surgical techniques are evident. In the earlier study, most patients undergoing reconstruction were aged 36–45, whereas in 2019–2023, the majority were aged 41–50. This shift may reflect a broader acceptance of reconstructive surgery among older patients and evolving medical practices that prioritize reconstruction even in advanced stages of life. Regarding reconstruction methods, between 1995–2000, the TRAM flap, predominantly pedicled, was most common, used in 63.7% of cases. In contrast, from 2019–2023, the latissimus dorsi flap was predominant (65.7%), followed by the TRAM (20%) and the DIEP flap (6.7%).²

Complication profiles also differ between these periods. From 1995–2000, partial epidermolysis and fat necrosis in TRAM flaps were most common, with two cases of flap loss due to vascular thrombosis. In 2019–2023, the most frequent complication was partial necrosis (6.7%), followed by alloplastic material exposure (2.9%).² These shifts in flap preference may be driven by increased alloplastic use, favoring simpler flaps like the latissimus dorsi flap, which has lower dissection complexity and complication rates. This strategy has likely reduced epidermolysis, fat necrosis and flap loss rates.

The COVID-19 pandemic significantly impacted patients with breast cancer diagnoses and treatments. Diagnostic delays during lockdowns resulted in more advanced symptomatic presentations.^{21,22} Consequently, breast reconstructions were postponed, as reflected in the number of surgeries: only 36 patients (34.3%) were operated on during the COVID-19 period (2019–2021), compared to 69 (65.7%) in 2022–2023. The reduction in surgical slots for delayed reconstructions further contributed to these numbers. However, as restrictions eased, the backlog of postponed reconstructions led to a marked increase in surgical volume, with 141 reconstructions performed by November 2024 alone. The main limitation of this study is the reduced number of patients, resulting from surgical delays during the COVID-19 pandemic. Additionally,

many medical records were lost or contained incomplete information, limiting the available data for analysis. The methods of breast reconstruction were also constrained by the hospital's available resources, which restricted the use of more resource-intensive surgeries that are currently considered the gold standard for breast reconstruction.

CONCLUSION

Advances in breast reconstruction techniques at the General Hospital of Mexico demonstrate a clear evolution from invasive methods to approaches with lower morbidity and improved aesthetic outcomes. Enhanced patient selection and refined surgical techniques have reduced complication rates, ensuring safer and more effective management of breast cancer. However, the choice of reconstruction remains individualized, highlighting the importance of a personalized approach tailored to each patient's characteristics and preferences.

The COVID-19 pandemic significantly disrupted surgical activities during the study period, reducing the number of patients undergoing reconstruction due to healthcare restrictions and resource reallocation. This event underscores the importance of analyzing post-pandemic trends, particularly in delayed and early reconstructions. A significant increase in procedures is anticipated, bolstered by the hospital's breast cancer program in collaboration with the oncology department.

Current data highlight a shift towards more sophisticated and safer reconstruction techniques, with a focus on minimizing complications while optimizing aesthetic and functional results. The General Hospital of Mexico has adapted to global trends in reconstruction, tailoring techniques to local realities and patient needs. Future endeavors will likely emphasize microvascular techniques like the DIEP flap and innovative methods that further reduce morbidity and enhance outcomes. Incorporating alloplastics with flaps such as the latissimus dorsi flap, which has fewer associated complications, will continue to play a pivotal role. This progression underscores the integral role of reconstructive surgery in breast cancer management, with a multidisciplinary approach prioritizing oncological outcome and patient quality of life.

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