International Journal of Medical Science and Clinical Research Studies

ISSN(print): 2767-8326, ISSN(online): 2767-8342

Volume 04 Issue 08 August 2024

Page No: 1473-1477

DOI: https://doi.org/10.47191/ijmscrs/v4-i08-10, Impact Factor: 7.949

Comprehensive Analysis of Breast Reconstruction Techniques: Surgical Approaches, Patient Outcomes, and Advancements in Oncoplastic Surgery

Ethel Jenny García Cruz[1], Oscar Alejandro Razo Ocegueda[2], Sayra Karelia Rivera Nájera[1], Eduardo Ibrahim Hernández Solis[1], José Santos González Bello[1]

[1]Departamento de Cirugía general, Hospital General Regional No1. Instituto Mexicano del seguro social. Vicente Guerrero, México.
[2]Departamento de Cirugía general, Hospital General Renacimiento, Secretaria de salud. Acapulco, México

ABSTRACT

Breast reconstruction following mastectomy is a critical aspect of the multidisciplinary management of breast cancer, significantly impacting patients' psychological and physical well-being. This review explores the various surgical techniques available for breast reconstruction, including autologous tissue reconstruction and implant-based methods. The article delves into the indications, contraindications, advantages, and potential complications associated with each approach. Furthermore, we examine the role of oncoplastic surgery in enhancing aesthetic outcomes while ensuring oncological safety. Advances in microsurgical techniques, the development of acellular dermal matrices, and the use of 3D imaging and printing technology are highlighted. The review also addresses patient selection criteria, preoperative planning, and postoperative care to optimize outcomes. By providing a comprehensive overview of contemporary practices and emerging innovations, this article aims to guide clinicians in the optimal management of breast reconstruction and to inform patients about their reconstructive options.

KEYWORDS: Breast reconstruction, autologous tissue, implant-based reconstruction.

ARTICLE DETAILS

Published On:
10 August 2024

Available on:
https://ijmscr.org/

INTRODUCTION

Breast cancer remains one of the most prevalent malignancies affecting women worldwide. While advances in early detection and treatment have significantly improved survival rates, the physical and psychological impacts of mastectomy necessitate a comprehensive approach to post-surgical reconstruction. Breast reconstruction aims to restore the breast's appearance and symmetry, thereby enhancing the patient's quality of life and body image. The evolution of reconstructive techniques has paralleled advancements in breast cancer treatment, allowing for increasingly sophisticated and personalized approaches.1,2,3

The choice of reconstructive technique is influenced by various factors, including the patient's anatomy, cancer treatment plan, and personal preferences. Autologous tissue reconstruction, utilizing the patient's own tissue, and implant-based reconstruction are the primary modalities employed. Each technique has distinct benefits and limitations, and the decision-making process must be individualized, taking into account the patient's medical history, desired aesthetic outcome, and potential for complications.4,5

In recent years, the field of oncoplastic surgery has emerged, integrating oncological and plastic surgery principles to achieve superior cosmetic results without compromising oncological safety. This multidisciplinary approach has broadened the options available for breast reconstruction, offering patients improved outcomes. This article aims to provide a detailed exploration of the current landscape of breast reconstruction, highlighting the latest surgical advancements and considerations for optimizing patient outcomes.5,6

Epidemiology of Breast Reconstruction

Breast reconstruction is a vital component of breast cancer treatment and post-mastectomy care, with its epidemiology intricately linked to the incidence and management of breast cancer. The prevalence of breast reconstruction procedures has been steadily increasing worldwide, paralleling the rising

incidence of breast cancer and the growing emphasis on quality of life outcomes for survivors.5,6

Globally, breast cancer is the most frequently diagnosed cancer among women, with an estimated 2.3 million new cases reported annually. It accounts for approximately 24.5% of all new cancer cases in women and is a leading cause of cancer-related mortality. The incidence of breast cancer varies geographically, with higher rates observed in developed countries, potentially due to lifestyle factors, better diagnostic capabilities, and comprehensive screening programs. Conversely, lower incidence rates in developing regions may reflect underdiagnosis and limited access to healthcare services. As a result, the demand for breast reconstruction varies significantly across different populations and healthcare systems.5,6

Breast reconstruction rates are influenced by numerous factors, including patient demographics, socioeconomic status, healthcare system characteristics, and cultural attitudes towards breast reconstruction. In high-income countries, where access to advanced medical care is more readily available, the rate of breast reconstruction is generally higher. For instance, in the United States, breast reconstruction following mastectomy is performed in approximately 40% of eligible patients. This rate has been influenced by various factors, including the implementation of laws mandating insurance coverage for reconstruction and an increase in the number of women opting for prophylactic mastectomy due to a heightened awareness of genetic risk factors such as BRCA mutations.6,7

In contrast, breast reconstruction rates are significantly lower in many low- and middle-income countries. Factors contributing to this disparity include limited availability of specialized surgical expertise, financial constraints, cultural perceptions, and a lack of awareness about reconstructive options. Additionally, in these regions, healthcare priorities often focus on immediate cancer treatment, with less emphasis on reconstructive procedures, leading to lower utilization rates.7,8

Age and racial/ethnic background also play crucial roles in the epidemiology of breast reconstruction. Younger patients are more likely to undergo reconstruction compared to older patients, potentially due to a greater concern for long-term body image and quality of life. Studies have shown that the likelihood of opting for reconstruction decreases with age, with significant drops observed in women over 60 years old. Racial and ethnic disparities are also evident, with studies indicating lower rates of breast reconstruction among African American, Hispanic, and Asian women compared to Caucasian women. These disparities may be attributed to a complex interplay of socioeconomic factors, cultural beliefs, and variations in access to healthcare.8,9

The type of breast cancer and the treatment modality chosen also influence the likelihood of undergoing breast reconstruction. Patients with early-stage breast cancer or those undergoing prophylactic mastectomy are more likely to opt for reconstruction compared to those with advanced disease. The decision-making process is further complicated by the potential impact of adjuvant therapies, such as radiation and chemotherapy, which may affect the timing and type of reconstruction. For instance, radiation therapy can significantly influence reconstructive outcomes, often necessitating delayed reconstruction to optimize aesthetic results and reduce complications.10,11

In conclusion, the epidemiology of breast reconstruction is multifaceted, influenced by a myriad of factors ranging from global cancer incidence trends to individual patient characteristics. Understanding these epidemiological patterns is crucial for healthcare providers and policymakers to address disparities in access to reconstructive surgery, improve patient education, and ensure that all eligible patients are informed of their options for post-mastectomy breast reconstruction. As the field of breast reconstruction continues to evolve with advancements in surgical techniques and technologies, ongoing research and data collection are essential to monitor trends and outcomes, ultimately enhancing the quality of care for breast cancer survivors worldwide.12,13

Clinical Case Presentation

Patient: Female, 47 years old.

Past Medical History: The patient denies chronic diseases, allergies, blood transfusions, alcohol use, and smoking. She has a history of laparoscopic cholecystectomy three years ago for chronic lithiasic cholecystitis. She was diagnosed with stage II left breast cancer four years ago, treated with a modified radical left mastectomy (Madden procedure). The patient received six cycles of chemotherapy using the TAC regimen and was treated with tamoxifen.

Current Illness: The patient's current condition began approximately four years ago when she noticed a mass in her left breast. Following the diagnosis of breast cancer, she underwent a modified radical left mastectomy (Madden procedure) with a good postoperative course. She received six cycles of chemotherapy and tamoxifen therapy as part of her medical oncology treatment. The patient achieved complete remission and is now planning breast reconstruction. Preoperative studies, including an angiographic CT scan and Doppler ultrasound, along with preoperative evaluation, showed no contraindications. The patient was then scheduled for surgical intervention by the plastic and reconstructive surgery team.

Ultrasound results (Doppler and Soft Tissue)

The subclavian, axillary, and humeral arteries and veins have a normal caliber and course, with no signs of stenosis or dilation. There is no evidence of thrombi; the veins are fully compressible, and the arteries have thin walls with adequate pulsatility. Blood flow directions and pulse waves are maintained, with a peak systolic velocity of 66 cm/s in the

subclavian artery and 114 cm/s in the axillary artery. The brachial plexus displays appropriate echogenicity, thickness, and course, with preserved anatomical relationships. No lymphadenopathy was observed. The muscular and subcutaneous planes are free of lesions, and the skin has a normal thickness.

Conclusion: Findings are within normal parameters.

Abdominal CT scan results (Non-contrast and Contrast Phases)

The left breast is absent due to prior surgery, with no evidence of a space-occupying lesion in the chest wall or left axilla. No pathological enhancement was identified with intravenous contrast administration. The bony structures show no evidence of lytic or blastic lesions. The observed lung fields are free of nodular lesions, with no evidence of airway or interstitial involvement, and the mediastinum is free of space-occupying lesions. The main vessels opacify adequately with contrast. The liver has a normal shape and size, with no nodules documented in the non-contrast phase. No pathological enhancements were observed in the arterial and venous phases. The intrahepatic bile ducts have a normal diameter, and the gallbladder is absent due to prior surgery. The spleen and pancreas are of normal morphology and density, with normal parenchymal enhancement with contrast. Both kidneys are in their usual locations, with smooth contours. The right kidney is of normal density with adequate parenchymal enhancement, while the left kidney shows a 7 mm hypodense, rounded, fluid-density lesion in the upper pole. The rest of the renal cortex appears normal, and the collecting systems are of normal diameter and density. The uterus is absent due to prior surgery. Other observed structures are normal.

Conclusion:

- Absence of the left breast without evidence of tumor activity in the chest wall or axillary region.
- Lungs without evidence of abnormalities.
- Liver without evidence of tumor activity.
- Bone structures without alterations.

Surgical Technique

After obtaining informed consent, the patient was transferred to operating room 6 and placed in the left lateral decubitus position under general anesthesia. Following aseptic and antiseptic preparation with iodine foam, sterile drapes were applied. The latissimus dorsi flap and the limits of the right and left breasts were marked.Figure 1

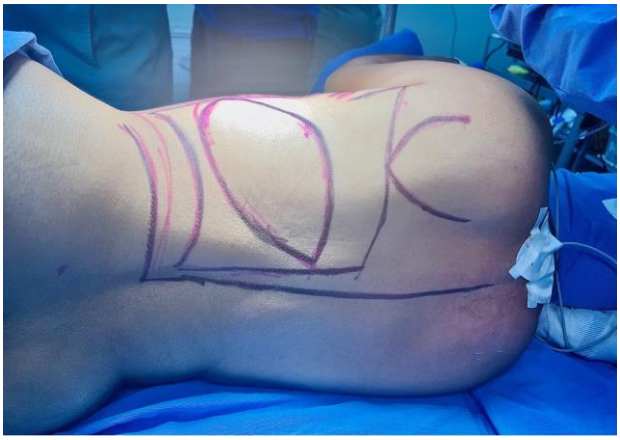

Figure 1. Preoperative grafts sites marking.

An incision was made on the island of the latissimus dorsi flap, approximately 25x15 cm, dissecting the skin and subcutaneous tissue, as well as the latissimus dorsi muscle fibers, freeing the flap from its attachments, leaving only its vascular pedicle. The previous scar was resected, and the subcutaneous tissue was dissected to the marked limits for the flap and implant. The flap was rotated under the marked bridge with appropriate synchronization to the recipient area. The incision edges in the latissimus dorsi region were closed, a drain was placed, hemostasis was confirmed, and the subcutaneous tissue was approximated with 1, 2, and 3-0 Vicryl. The skin was closed with 2-0 nylon subcuticular stitches, and the drain was secured with 1 silk. A closed system drain was connected, the wounds were covered, and the patient was repositioned. The surgical area was re-sterilized, and the marked limits were dissected. The pectoralis major and minor muscles were dissected to create space for the implant. Sutures were placed to fix the submammary fold and mark the submammary crease with 1 Prolene. A 360 cc implant, soaked in amikacin solution, was placed in the retropectoral space. The retropectoral space was closed with 2-0 nylon sutures. Two drains, one in the subcutaneous tissue and another in the retropectoral space, were placed. The subcutaneous tissue was sutured with 2-0 and 3-0 Vicryl, and the skin was closed with 3-0 nylon subcuticular stitches. Figure 2

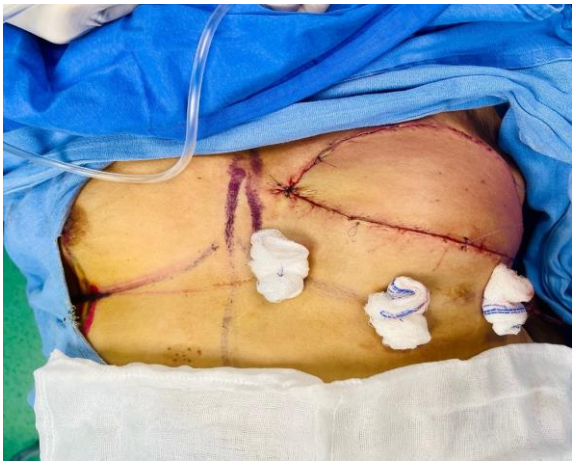

Figure 2. Postoperative results.

The wound was cleaned, covered, and the procedure concluded without incidents or complications. The patient was stable and transferred to the recovery room.

Findings: Surgical absence of the left breast, normal left latissimus dorsi muscle, pectoralis major and minor muscles, and a surgical scar approximately 28 cm x 1 cm.

Postoperative Course: The patient remained asymptomatic postoperatively, with a thoracic bandage applied. Drain output was monitored, and the patient was discharged on the second postoperative day with close follow-up in the outpatient clinic. However, the patient experienced serohematic discharge from the surgical wound's internal sternal edge, necessitating suture removal and drain removal. The evolution was poor, requiring removal of the breast implant, but the flap integration and evolution were adequate. Figure3 A second surgical stage was planned 10 months after the first surgery to place a new breast implant. Figure 4.The implant was placed without complications in the retropectoral space, and a drain was left in place. The patient was discharged in good condition and continues to be followed up in the outpatient clinic, showing a good evolution.

Figure 3. One week after surgery.

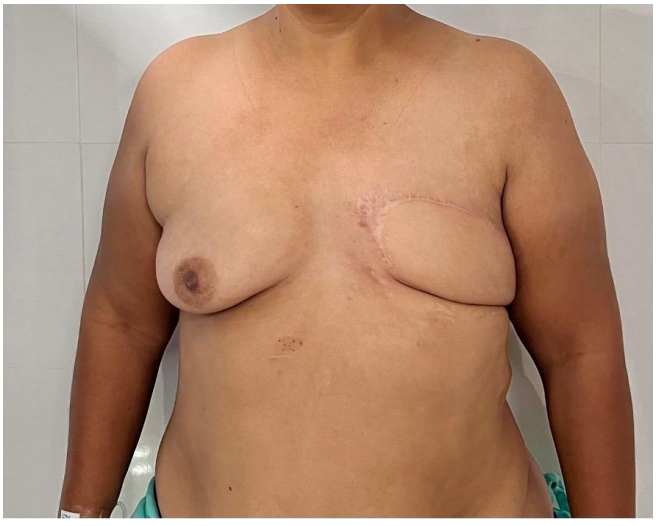

Figure 4. 10 months after surgery.

CONCLUSION

Breast reconstruction represents a pivotal aspect of comprehensive breast cancer management, offering not only the restoration of physical form but also significant psychological benefits. The choice of reconstruction technique—whether autologous tissue-based, implant-based, or a combination of both—is contingent upon a multifactorial decision-making process involving the patient's medical history, cancer treatment plan, anatomical considerations, and personal preferences. The evolution of reconstructive techniques has been paralleled by advancements in surgical technology, including microsurgery, the use of acellular dermal matrices, and innovations in 3D imaging and printing, which have collectively enhanced aesthetic outcomes and expanded the repertoire of reconstructive options available to patients.

Despite these advancements, significant disparities in access to and utilization of breast reconstruction persist, influenced by socioeconomic factors, geographic location, healthcare infrastructure, and cultural attitudes. These disparities underscore the need for targeted interventions to ensure equitable access to reconstructive services, particularly in low- and middle-income countries where access to specialized surgical expertise is limited. Furthermore, the impact of adjuvant therapies, such as radiation and chemotherapy, on reconstructive outcomes necessitates careful planning and coordination between oncological and reconstructive surgical teams to optimize patient outcomes.

Patient-centered care is paramount in breast reconstruction, requiring a nuanced understanding of the psychosocial dimensions of reconstruction. The decision to undergo reconstruction is deeply personal and should be supported by comprehensive counseling that encompasses the risks, benefits, and potential complications of the various reconstructive options. As such, healthcare providers must be equipped with the knowledge and resources to guide patients through this complex decision-making process, ensuring that they are well-informed and supported throughout their treatment journey.

The field of breast reconstruction continues to evolve, with ongoing research and innovation paving the way for more refined techniques and improved outcomes. Future directions in breast reconstruction may include the integration of regenerative medicine approaches, such as stem cell therapy, and the development of bioengineered tissues, which hold promise for enhancing reconstructive outcomes and reducing donor site morbidity. Additionally, advances in preoperative planning, including the use of virtual reality and augmented reality, may further enhance surgical precision and patient satisfaction.

In conclusion, breast reconstruction is a dynamic and integral component of breast cancer care, with far-reaching implications for patient quality of life and long-term well-being. As the field progresses, a continued focus on

personalized care, equitable access, and interdisciplinary collaboration will be essential to advancing the standard of care in breast reconstruction. Through these efforts, we can ensure that all patients have the opportunity to make informed decisions about their reconstructive options and achieve the best possible outcomes in their journey towards recovery and healing.

REFERENCES

I. *Facts and figures | breast cancer UK*. Available at: https://www.breastcanceruk.org.uk/about-breast-cancer/facts-figures-and-qas/facts-and-figures/.

II. *Breast cancer*. Available at: https://www.who.int/news-room/fact-sheets/detail/breast-cancer.

III. *Breast cancer statistics and facts | breast cancer now*. Available at: https://breastcancernow.org/about-us/media/facts-statistics.

IV. Group on Hormonal Factors in Breast Cancer C . Type and timing of menopausal hormone therapy and breast cancer risk: individual participant meta-analysis of the worldwide epidemiological evidence. *Lancet* (2019) 394(10204):1159–68. doi: 10.1016/S0140-6736(19)31709-X

V. Beral V, Peto R, Pirie K, Reeves G. Menopausal hormone therapy and 20-year breast cancer mortality. *Lancet* (2019) 394(10204):1139. doi: 10.1016/S0140-6736(19)32033-1

VI. Ravdin PM, Cronin KA, Howlader N, Berg CD, Chlebowski RT, Feuer EJ, et al.. The decrease in breast-cancer incidence in 2003 in the united states. *N Engl J Med* (2007) 356(16):1670–4. doi: 10.1056/NEJMsr070105

VII. Banks E, Canfell K. Recent declines in breast cancer incidence: mounting evidence that reduced use of menopausal hormones is largely responsible. *Breast Cancer Res* (2010) 12(1):1–3. doi: 10.1186/bcr2463

VIII. Mcdonald JA, Goyal A, Terry MB. Alcohol Intake and Breast Cancer Risk: Weighing the Overall Evidence. *Curr Breast Cancer Rep*. (2013) 5(3):10.1007/s12609-013-0114-z. doi: 10.1007/s12609-013-0114-z

IX. Seitz HK, Pelucchi C, Bagnardi V, Vecchia C. *REVIEW epidemiology and pathophysiology of alcohol and breast cancer*. Available at: https://academic.oup.com/alcalc/article/47/3/204/145832.

X. Smith-Warner SA, Spiegelman D, Yaun SS, van den Brandt PA, Folsom AR, Goldbohm RA, et al.. Alcohol and breast cancer in women: a pooled analysis of cohort studies. *JAMA* (1998) 279(7):535–40. doi: 10.1001/jama.279.7.535

XI. Williams LA, Olshan AF, Tse CK, Bell ME, Troester MA. Alcohol intake and invasive breast cancer risk by molecular subtype and race in the Carolina breast cancer study. *Cancer Causes Control* (2016) 27(2):259–69. doi: 10.1007/s10552-015-0703-4

XII. Klintman M, Rosendahl AH, Randeris B, Eriksson M, Czene K, Hall P, et al.. Postmenopausal overweight and breast cancer risk; results from the KARMA cohort. *Breast Cancer Res Treat* (2022) 196(1):185–96. doi: 10.1007/s10549-022-06664-7

XIII. Neuhouser ML, Aragaki AK, Prentice RL, Manson JAE, Chlebowski R, Carty CL, et al.. Overweight, obesity, and postmenopausal invasive breast cancer risk: a secondary analysis of the women's health initiative randomized clinical trials. *JAMA Oncol* (2015) 1(5):611–21. doi: 10.1001/jamaoncol.2015.1546