

Challenges and outcomes of breast reconstruction in advanced-stage breast cancer: a comprehensive review

Desafíos y resultados de la reconstrucción mamaria en cáncer de mama en etapa avanzada: una revisión integral

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Abstract

Post-mastectomy breast reconstruction plays a crucial role in the psychological well-being and long term quality of life of patients with breast cancer. However, its role in advanced stages (stages III–IV) remains debatable. To analyze the clinical outcomes and potential benefits of breast reconstruction in patients with advanced-stage breast cancer, a systematic review of studies on the reconstructive approach published between January 2018 and March 2025 was conducted. There is a marked paucity of studies focused on this topic, and most available data derive from small case series or observational reports, which suggest that breast reconstruction may be technically feasible and associated with acceptable complication rates in selected cases. Nevertheless, the impact of aggressive adjuvant therapies, such as chemotherapy and radiotherapy, on final aesthetic outcomes in this population remains poorly defined. There is an urgent need for prospective studies evaluating both clinical outcomes and patient satisfaction to guide surgical decision-making in women with advanced-stage breast cancer.

Keywords: Advanced breast cancer. Breast reconstruction. Radical mastectomy. Surgical outcomes. Quality of life. Adjuvant therapy.

Resumen

La reconstrucción mamaria posmastectomía es crucial para el bienestar psicológico y la calidad de vida a largo plazo de las pacientes con cáncer de mama. Sin embargo, su rol en los estadios avanzados (etapas III-IV) continúa siendo debatible. Para analizar los resultados clínicos y los beneficios de la reconstrucción mamaria en pacientes con cáncer de mama en estadios avanzados se realizó una revisión sistemática de estudios sobre el abordaje reconstructivo publicados entre enero de 2018 y marzo de 2025. Existe una marcada escasez de estudios enfocados en este rubro y la mayoría de los datos provienen de series de casos pequeñas o reportes observacionales, los cuales sugieren que la reconstrucción puede ser técnicamente factible y presentar aceptables tasas de complicaciones en casos seleccionados. No obstante, la influencia de las terapias adyuvantes agresivas, como la quimioterapia y la radioterapia, sobre los resultados estéticos finales en esta población aún

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Date of reception: 20-08-2025

Date of acceptance: 29-01-2026

DOI: 10.24875/CIRUE.M26000936

Cir Cir (Eng). 2026;94(2):220-226

Contents available at PubMed

www.cirugiyacirujanos.com

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no está claramente establecida. Existe una necesidad urgente de estudios prospectivos que evalúen tanto los resultados clínicos como la satisfacción de las pacientes, con el fin de orientar la toma de decisiones quirúrgicas en mujeres con cáncer de mama en estadio avanzado.

Palabras clave: Cáncer de mama avanzado. Reconstrucción mamaria. Mastectomía radical. Resultados quirúrgicos. Calidad de vida. Terapia adyuvante.

Introduction

Breast cancer is one of the most prevalent neoplasms in women worldwide.¹ Early detection, the rise of targeted therapy, and selective surgery have significantly reduced mortality from this neoplasm, making it possible to prioritize both survival and quality of life after treatment.² Breast reconstruction after mastectomy is a fundamental component of comprehensive breast cancer care, as it restores body image and promotes the psychological well-being of affected patients.^{3,4} Although the aesthetic benefits of breast reconstruction are well documented in the early stages of this neoplasm, the role of oncoplastic surgery in advanced disease remains a matter of debate and has been scarcely explored.⁵ Breast reconstruction in advanced tumor stages entails specific therapeutic challenges inherent to the aggressive treatment to which patients are subjected.⁶ In such cases, surgical interventions involve radical procedures for oncological control, while also considering the aesthetic management of ulcerations, fibrosis, and chest wall defects secondary to previous treatments.⁷ Breast reconstruction in this context is complex and multifactorial, requiring careful assessment of oncological safety, life expectancy, the risk of postoperative complications, and the possibility of delaying systemic adjuvant therapies. Additionally, in advanced disease, treatment goals often go beyond survival and include symptom control and preservation of dignity and quality of life.^{8,9} It is currently considered that, in selected patients, breast reconstruction offers concrete benefits in body image, psychosocial adjustment, and general well-being, even in a palliative care setting.¹⁰ However, the scientific evidence supporting these approaches remains limited in the general population with breast cancer, particularly regarding reconstructive outcomes, complication rates, wound healing, and aesthetic outcome, elements that have not been adequately evaluated in this population.^{11,12}

This review critically analyzes the available evidence on breast reconstruction in patients with advanced breast cancer, including those undergoing

radical mastectomy. Its purpose is to examine the main challenges and surgical outcomes reported in the literature, evaluate the impact of reconstruction on quality of life and patient-reported outcomes, and explore how aggressive adjuvant therapies may influence surgical success and patient satisfaction.

Method

Search strategy

We conducted a systematic review of the literature using the PubMed digital repository, selected because of its comprehensive coverage of peer-reviewed biomedical and clinical research. The objective was to identify studies that evaluated surgical outcomes, quality of life, and reconstructive success in patients with advanced-stage breast cancer (III-IV) undergoing radical mastectomy, with or without subsequent breast reconstruction. The search included articles published between January 2018 and November 2024. Cross-checking with Scopus and Web of Science was initially performed; however, because of the high number of duplicates, only PubMed was used for the final selection. To ensure broad but specific inclusion criteria, the following keywords and Boolean combinations were used: ("Breast Neoplasms" OR "Breast Cancer" OR "Advanced Breast Cancer") AND ("Mastectomy, Radical" OR "Radical Mastectomy") AND ("Reconstructive Surgical Procedures" OR "Breast Reconstruction") AND ("Advanced Stage" OR "Locally Advanced" OR "Stage III" OR "Stage IV") AND ("Adjuvant Therapy" OR "Chemotherapy" OR "Radiotherapy") AND ("Quality of Life" OR "Patient Satisfaction" OR "Psychosocial Outcomes") AND ("Surgical Outcomes" OR "Complications" OR "Oncologic Outcomes"). Only articles published in English or Spanish were included.

Eligibility criteria

Study selection followed the PRISMA (Preferred Reporting Items for Systematic Reviews and

Meta-Analyses) guidelines and was structured using the PICOS framework:

- Population: adult women diagnosed with stage III or IV breast cancer undergoing radical mastectomy, with or without breast reconstruction.^{13,14}
- Intervention: any modality of reconstructive surgery, including autologous tissue flaps, implant-based reconstruction, or use of acellular dermal matrix.
- Comparison: patients who did not receive reconstruction or who underwent alternative reconstructive modalities.
- Outcomes: surgical outcomes, complications and wound healing; patient-reported outcomes, quality of life and satisfaction; and psychosocial impact.
- Study design: original articles, including randomized clinical trials, cohort studies, prospective or retrospective, case series, and relevant case reports.

Systematic reviews, meta-analyses, editorials, expert opinion documents, and studies with pre-experimental designs or incomplete follow-up data were excluded. Articles without access to the full text and those published in languages other than English and Spanish were also excluded.

Study selection process

The initial search identified a total of 204 articles, of which, after review of titles and abstracts, 188 were excluded for the following reasons: 74 addressed only early-stage or locally advanced, nonmetastatic breast cancer; 48 lacked data on reconstructive procedures or outcomes; 35 were duplicates or publications before 2018; 30 did not meet the methodological criteria; and 1 was written in a noneligible language. After full-text review, only one study met all inclusion criteria and was incorporated into the final analysis (Fig. 1). The remaining 15 potentially relevant studies were excluded during the eligibility phase because of the absence of specific reconstruction outcomes or the exclusion of patients with metastatic disease.

Quality assessment

The quality of the included study was assessed using the Cochrane risk-of-bias tool and was independently evaluated by three reviewers.¹⁵ Discrepancies were resolved by consensus. Because only one study was included, the detailed summary of the quality

assessment is presented in the main text rather than in a separate table.

Data synthesis

Given the extremely limited number of eligible studies and the heterogeneity in design, patient population, and reporting of outcomes, a narrative synthesis approach was chosen. A quantitative meta-analysis was not feasible.¹⁶ Key themes, such as feasibility, surgical safety, patient satisfaction, and psychosocial benefits in the context of advanced-stage breast cancer, were extracted and summarized narratively.

Results

A comprehensive review of the current literature shows a marked scarcity of studies specifically addressing the outcomes of breast reconstruction in patients with stage IV, metastatic, breast cancer. Of a total of 16 studies identified, only one (6.25%) met the inclusion criteria by including patients with metastatic disease and reporting outcomes directly related to reconstructive surgery. The remaining 15 studies (93.75%) were excluded because they focused on early-stage or locally advanced disease, explicitly excluded patients with metastases from their analyses, or did not provide relevant data on reconstructive outcomes. The only study included was a case series conducted by Teklebrhan et al.,¹⁷ who reported on seven women with metastatic breast cancer and locoregional recurrence who underwent reverse abdominoplasty for chest wall reconstruction. The mean age of the patients was approximately 53.6 years, and several were receiving palliative chemotherapy or hormone therapy at the time of surgery. The authors documented favorable postoperative outcomes, including adequate wound healing, no major surgical complications, and only minor events, such as seroma formation or superficial wound dehiscence. Importantly, patients reported minimal functional limitations and maintained satisfactory performance in daily activities, as assessed using the SF-36 quality-of-life questionnaire. Similarly, aesthetic satisfaction was high despite the palliative context, highlighting the potential psychosocial benefits of reconstruction even in advanced disease settings. Although limited by the small sample size and observational design, this study provides preliminary evidence supporting the technical feasibility and possible quality-of-life improvements associated with reconstructive

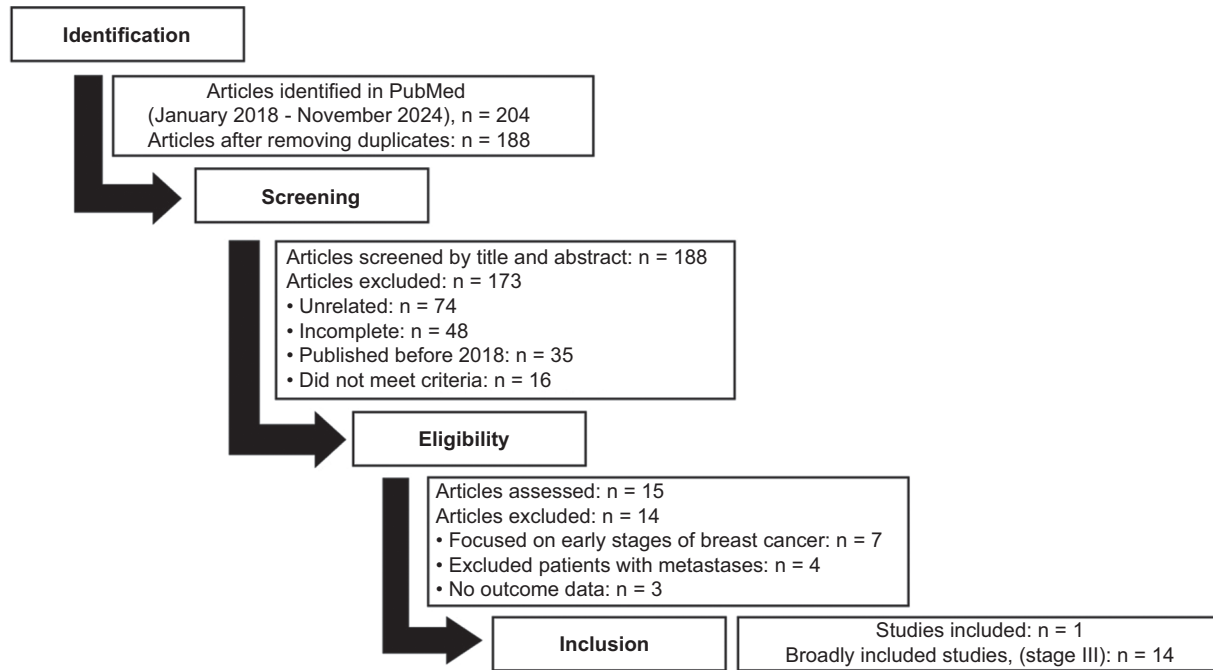


Figure 1. Article selection flowchart (PRISMA).

procedures in selected patients with metastatic breast cancer.

The 15 excluded studies were distributed across several categories. A large subgroup consisted of retrospective cohort studies and cross-sectional studies focused on patients with early-stage (I-III) or locally advanced breast cancer, many of whom received neo-adjuvant chemotherapy or radiotherapy.^{18,19} These studies systematically excluded patients with stage IV disease; therefore, their findings are not applicable to the population with metastases. Other studies focused on breast-conserving oncoplastic surgery or immediate lymphatic reconstruction to mitigate lymphedema,^{20,21} but again were limited to early-disease scenarios and did not address postmastectomy reconstruction in stage IV disease. Similarly, isolated case reports and small series described individual surgical interventions or survival outcomes,^{17,22} without providing sufficient data on reconstructive techniques or patient-reported outcomes. Some publications corresponded to clinical trial protocols²³ or computational models analyzing survival,^{24,25} without including information on surgical reconstruction or quality-of-life indicators. In addition, some large cohort studies included a small percentage of patients with metastatic disease, for example, up to 5.8% in Buckley et al.,²⁶ but did not stratify reconstructive outcomes for this subgroup. Finally, studies comparing oncoplastic

techniques and total reconstructions, such as that conducted by Lisboa et al.,²⁷ generally reported better aesthetic outcomes with oncoplastic approaches, although with an insignificant number of cases with metastases and no specific subgroup analyses.

This detailed synthesis reveals a critical knowledge gap in the literature regarding reconstructive surgery in patients with metastatic breast cancer. Despite the broad body of evidence supporting reconstruction in early and locally advanced disease, the absence of prospective, high-quality data in stage IV populations is evident. The available evidence, limited to a single small case series, suggests that reconstructive procedures may offer functional and psychosocial benefits, including improvements in quality of life and body image, even within a palliative care framework. These findings underscore the need for further research to better understand the role, risks, and benefits of breast reconstruction in the context of metastatic breast cancer, considering the particular clinical and emotional challenges faced by this patient population.

Discussion

Breast reconstruction after radical mastectomy has been widely studied in early-stage and locally advanced breast cancer (I-III), with numerous studies

demonstrating its benefits in psychosocial recovery, aesthetic outcomes, and quality of life. However, for patients diagnosed with advanced-stage disease, particularly those with stage IV or metastatic breast cancer, the evidence base remains limited and fragmented. In the present review, 204 articles were evaluated through a comprehensive search strategy that included key terms such as “Breast Neoplasms,” “Radical Mastectomy,” “Breast Reconstruction,” “Stage IV,” “Chemotherapy,” “Quality of Life,” and “Surgical Outcomes.” Of these, only 16 studies were considered potentially relevant after title and abstract review, and only 1 (6.25%) met the inclusion criteria by specifically reporting reconstructive outcomes in patients with metastatic breast cancer. This important gap in the literature highlights a persistent clinical and academic omission: the implicit or explicit exclusion of patients with stage IV breast cancer from studies on surgical reconstruction. The only study that addressed this population, a case series published by Teklebrhan et al.,¹⁷ documented positive outcomes in seven women who underwent reverse abdominoplasty for chest wall reconstruction. Despite the small sample size and retrospective design, the findings underscored relevant aspects: adequate wound healing, minimal functional limitations, and patient-reported satisfaction in both functional and aesthetic domains, even in a palliative care setting. These observations challenge the historical notion that reconstructive procedures should be considered contraindicated or of lower priority in metastatic disease because of limited life expectancy or presumed surgical risk.²¹ In the broader field of palliative oncological surgery, several interventions, including resection of symptomatic metastases, palliative bypass procedures, and surgical wound management, have demonstrated significant benefits in symptom control and quality of life, even in patients with reduced life expectancy.^{6,7} These findings emphasize that surgical procedures in advanced cancer should not be dismissed solely on the basis of survival projections, but should instead be evaluated for their ability to relieve suffering, improve functional outcomes, and preserve patient dignity. Breast reconstruction, when performed with these objectives, aligns with the fundamental principles of palliative care and supportive oncology.^{29,30} The widespread exclusion of patients with metastases from the literature may be rooted in long-standing clinical paradigms that regard aggressive local treatment in stage IV breast cancer as unjustified or futile, as well as offering limited aesthetic or functional

benefit in patients with shorter life expectancy.³¹ However, this perspective overlooks the nuanced goals of care in this population, in which quality of life, symptom management, and psychological well-being often take priority. Emerging evidence in palliative oncology suggests that selected surgical interventions may relieve symptoms, restore body image, and reinforce dignity in patients with potentially terminal diseases.³² In this context, breast reconstruction, when feasible, should be evaluated not only from an oncological perspective, but also as part of a comprehensive patient-centered framework that includes psychosocial, functional, emotional, and aesthetic satisfaction dimensions.^{33,34} In addition, contemporary oncological care increasingly promotes patient autonomy and shared decision-making as fundamental ethical pillars.³⁵ Involving patients with advanced-stage breast cancer in open discussions about reconstructive options, whether with curative, palliative, or supportive intent, respects their right to make informed decisions about their body, identity, and quality of life.³⁶ Encouraging patients to express their preferences strengthens trust, reinforces the therapeutic alliance, and may increase satisfaction with treatment and psychosocial outcomes, regardless of the clinical stage of disease.³⁷

On the other hand, several key limitations of this study must be acknowledged. First, the available evidence is predominantly anecdotal, consisting of isolated case reports and small series without control groups, standardized outcome measures, or long-term follow-up. Second, studies that include patients with stage IV disease often omit stratified outcome analysis or lack subgroup analyses, which prevents conclusions from being drawn regarding safety, satisfaction, or impact on quality of life. Third, heterogeneity in definitions, such as what constitutes “advanced disease” or “reconstructive success,” makes comparison across studies and synthesis difficult.

The systematic exclusion of patients with stage IV breast cancer from clinical research on breast reconstruction may inadvertently perpetuate inequalities in access to comprehensive, multidisciplinary care. This gap reflects not only a scientific omission, but also an ethical issue, as it may potentially reinforce stigmas that hinder the implementation of quality-of-life interventions in populations with advanced disease. Addressing this inequity is essential to ensure that all patients, regardless of prognosis, receive holistic care options aligned with their values and preferences.^{28,30} In light of these limitations, future research should

prioritize prospective, multicenter studies that specifically include patients with advanced-stage and metastatic breast cancer. These studies should adopt standardized definitions and outcome measures, including patient-reported outcomes in terms of satisfaction, e.g., BREAST-Q, physical function, e.g., SF-36, and psychosocial well-being.³⁹ Qualitative methodologies should also be incorporated to capture the experiences, values, and preferences of this population. At the same time, oncological safety must continue to be evaluated, recognizing that in the metastatic context surgical decisions are guided by quality-of-life considerations as well as survival criteria.

Another area requiring further exploration is the integration of reconstructive surgery into multimodal treatment schemes, including systemic therapy, palliative radiotherapy, and supportive care. As reconstructive techniques continue to evolve, their role within the multidisciplinary management of oncology patients, including those with complex advanced-stage disease, should be recognized not only as an aesthetic adjunct, but also as an essential part of comprehensive oncological rehabilitation.⁴⁰ This approach recognizes the multidimensional needs of patients with breast cancer and highlights the importance of integrating surgical reconstruction into personalized treatment plans aimed at optimizing both clinical outcomes and patient well-being. A deeper understanding of how reconstruction interacts with ongoing chemotherapy or targeted therapies, particularly in relation to safety, complication rates, and patient tolerance, could help define the optimal timing and selection of candidates. Similarly, interdisciplinary collaboration among surgical oncologists, reconstructive surgeons, medical oncologists, and psycho-oncology teams is essential to provide personalized, value-based care.

This review demonstrates a marked lack of robust studies on breast reconstruction in patients with stage IV breast cancer. Although traditional paradigms have frequently excluded this population from reconstructive consideration, preliminary data suggest that, in selected cases, surgery may provide significant functional and psychosocial benefits. Reducing this evidence gap will require a shift in research priorities, greater inclusion of patients with advanced-stage disease in clinical studies, and a redefinition of the concept of surgical success aligned with patient-centered outcomes rather than survival alone. Addressing these gaps is essential to ensure that all patients with breast cancer, at any stage, have access to comprehensive, dignified, and compassionate care.

Conclusions

This review demonstrates a critical gap in the current literature regarding breast reconstruction in patients with advanced-stage breast cancer. The available evidence suggests that breast reconstruction may be technically feasible and associated with functional, aesthetic, and psychosocial benefits, even in a palliative context. However, the absence of high-quality data prevents definitive conclusions and highlights the urgent need for well-designed prospective studies that include patients with advanced-stage disease, with the aim of improving quality of life, dignity, and body image for all patients affected by breast cancer. Therefore, a paradigm shift is required that recognizes reconstruction as a potential component of comprehensive patient-centered care for all patients.

Funding

The authors declare that they received no funding for this study.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments on humans or animals were performed for this research.

Confidentiality, informed consent, and ethical approval. The study does not involve personal data, medical records, or human biological samples; therefore, ethical approval is not required. The SAGER guidelines do not apply.

Declaration on the use of artificial intelligence. The authors declare that no type of generative artificial intelligence was used for the writing or creation of content in this manuscript.

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