



The Impact Of Postmastectomy Radiation On Autologous Microsurgical Breast Reconstruction: A Comparison Of Immediate Vs Delayed-immediate Reconstruction



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Introduction

- Breast cancer remains one of the most prevalent malignancies affecting women worldwide, often necessitating mastectomy as a primary treatment¹.
- Autologous reconstruction, where tissue from the patient's own body is used to recreate the breast, is a widely accepted reconstructive approach².
- Current literature lacks sufficient data to establish a standard of care regarding the timing of post-mastectomy radiation therapy (PMRT) following autologous breast reconstruction in women undergoing breast cancer treatment.
- Radiation therapy to flap tissue can cause fibrosis, fat necrosis, and volume loss which can lead to severe complications^{3,4}.
- Delayed autologous reconstruction is when the patient receives a mastectomy, and months to years later will have a microsurgical flap reconstruction.
- Delayed-immediate autologous breast reconstruction, in which the patient surgically receives a tissue expander which is irradiated and later replaced with flap tissue, has been known to minimize postoperative complications⁵ and often do not require revision procedures. However, multiple procedures often leave women scarred and left with aesthetic deformities⁶.
- Immediate reconstruction, in comparison, allows for a flap directly following mastectomy. The flap is then irradiated, leaving it at risk for complications, however, avoiding the psychological consequences and aesthetic disturbances⁴.

Aim

- This study aims to evaluate whether immediate or delayed-immediate breast reconstruction, in the context of anticipated radiation therapy, yields better healing and long-term outcomes.
- We aim to evaluate the outcomes in terms of complications, revisions, aesthetic results, sensory return, and patient satisfaction to inform clinical decisions and guide women through their reconstructive journey, ensuring the best possible healing and long-term outcomes.

Methods

- We conducted a comprehensive search across databases including PubMed, CINAHL, Cochrane Library, Scopus, and Web of Science.
- From an initial 1,442 studies, 11 met our assessment criteria.
- Inclusion criteria included:
 - Study design: Randomized controlled trials, cohort studies, case-control studies, or large case series
 - Women undergoing autologous breast reconstruction following mastectomy for breast cancer, with a known need for postmastectomy radiation therapy (PMRT)
 - Studies comparing timing of PMRT
 - Flap types: DIEP, FTRAM, PTRAM, SIEA, SGAP, or LD flaps
 - All full text articles were published in English.
- Exclusion criteria included:
 - Non-autologous reconstruction
 - Studies not comparing timing of reconstruction
 - Flap types not specified or not relevant to autologous reconstruction
 - Case reports, editorials, expert opinions, conference abstracts
 - Studies involving patients not receiving radiation therapy post-mastectomy
 - Studies not reporting relevant outcomes
 - Animal or in vitro studies
- Outcomes evaluated included complications, revisions, aesthetics, sensory return, patient satisfaction, and need for revision.

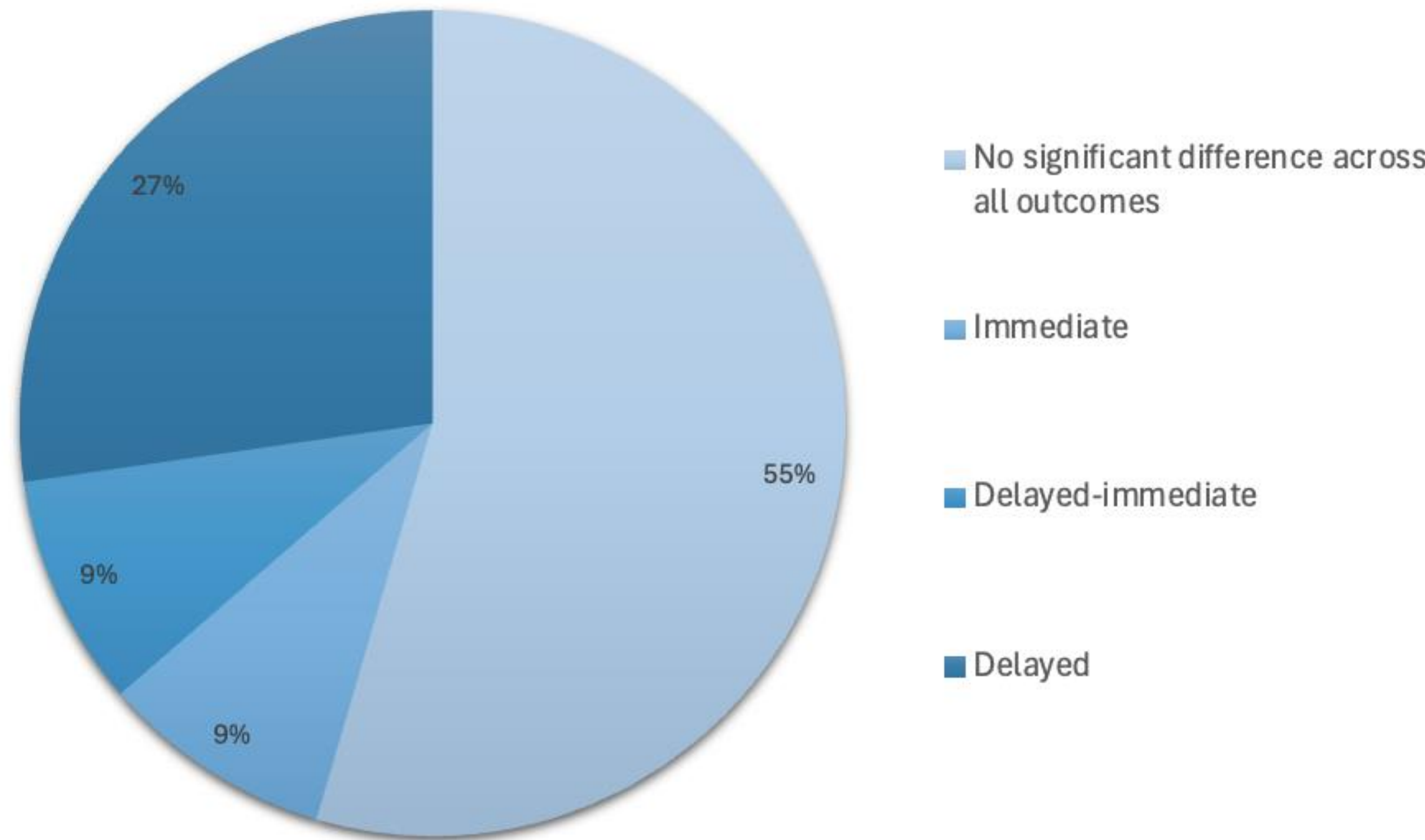


Figure 2: Overall findings from assessed studies. Of the 11 studies included, 1 (9%) indicated that immediate reconstruction yielded superior aesthetics and quality of life, with no significant difference in complications. Six studies (55%) reported no major differences between immediate, delayed-immediate, or delayed reconstruction across all outcomes. One study (9%) found delayed-immediate led to less flap loss and revisions, however overall no difference in complications. Three studies (27%) showed that delayed reconstruction resulted in better outcomes overall.

Conclusions

- This systematic review addresses a significant professional practice gap in the field of breast cancer treatment regarding the timing of radiation therapy following autologous breast reconstruction.
- There is no significant difference in adverse outcomes associated with radiotherapy between immediate, delayed, and delayed-immediate reconstruction.
- Immediate reconstruction is a viable option for women aiming to minimize surgical procedures during cancer treatment, offering enhanced aesthetic results and quality of life
- Delayed-immediate reconstruction may lower complication rates and revision needs.
- By evaluating the timing of PMRT, we can provide insights to inform clinical decision-making, ultimately improving patient care and outcomes in a context where conflicting information exists in the literature.
- These findings can lead to personalized treatment plans that align with patients' preferences and needs, ultimately improving overall satisfaction and quality of life.

Study	Study Design	Population	Flap Type	Outcomes Studied	Conclusion (delayed, immediate, delayed-immediate, no significant difference)
Wang 2023	Prospective cohort study	91 patients: 26 delayed-immediate, 65 immediate	DIEP	Sensory return	No significant difference
Huang 2022	Retrospective cohort study	248 patients: 193 immediate, 55 delayed-immediate	DIEP	Complications	No significant difference
O'Connell 2018	Retrospective cohort study	167 patients: 80 without radiotherapy, 28 with immediate radiotherapy, 38 with delayed radiotherapy, and 21 delayed-immediate	DIEP	Aesthetic outcome, Patient satisfaction	No significant difference
He 2017	Retrospective cohort study	360 patients: 278 without radiotherapy (158 immediate, 120 delayed), 92 with radiotherapy (61 immediate, 31 delayed)	TRAM, DIEP	Complications, Patient satisfaction, Aesthetic outcome and Quality of life	No significant difference
Proulx 2002	Retrospective chart review	15 patients: 8 immediate, 7 delayed	TRAM	Complications, Flap viability, Aesthetic outcome	No significant difference
Williams 1997	Retrospective chart review	680 patients: 108 immediate, 19 delayed, 553 no radiotherapy	TRAM	Complications	No significant difference in complications, however immediate reconstruction leads to higher rates of necrosis, delayed reconstruction leads to higher rates of fibrosis.
Patel 2013	Retrospective chart review	192 patients: 118 delayed, 74 delayed-immediate	MS-TRAM, DIEP, SGAP	Complications (Flap loss, Revisions)	No significant difference in complications, however delayed-immediate leads to less flap loss and revisions.
Billig 2018	Prospective cohort study	175 patients: 108 immediate, 67 delayed	FTRAM, DIEP, SIEA, combined	Complications, Patient satisfaction, Aesthetic outcome, Quality of life	No significant difference for complications. Immediate had improved outcomes for patient satisfaction, including aesthetics and quality of life.
Alderman 2002	Prospective cohort study	325 patients: 79 implant based reconstruction (65 immediate, 14 delayed), 179 Pedicled TRAM (96 immediate, 83 delayed), and 67 Free TRAM (48 immediate, 19 delayed)	PTRAM, FTRAM	Complications	Delayed reconstruction led to fewer complications.
Tran 2001	Retrospective chart review	102 patients: 32 immediate and 70 delayed	TRAM	Complications	Delayed reconstruction led to fewer complications.
Jagsi 2017	Prospective cohort study	2247 patients: 1625 without radiotherapy, 622 with radiotherapy (516 immediate, 106 delayed)	LD, PTRAM, FTRAM, DIEP	Complications	Delayed reconstruction led to fewer complications, however there was no significant difference in major complications.

Figure 3: Included articles in systematic review, with study design, population, flap type, primary outcome of study, and conclusion for PMRT timing highlighted. Flap types analyzed included Deep Inferior Epigastric Perforator (DIEP), Pedicled Transverse Rectus Abdominis Myocutaneous Flap (PTRAM), Free Transverse Rectus Abdominis Myocutaneous Flap (FTRAM), Latissimus Dorsi Flap (LD), Superior Gluteal Artery Perforator Flap (SGAP), and Superficial Inferior Epigastric Artery Flap (SIEA).

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Figure 1: Process of identifying and screening the articles using PRISMA guidelines, leading to the 11 articles included in the review. From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71