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# Patient-centred decision making in breast reconstruction utilising the delayed–immediate algorithm<sup>☆</sup>



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**Summary** Delayed–immediate reconstruction is an increasingly valuable algorithm for patients anticipating post-mastectomy radiation therapy. Despite the cosmetic and long-term advantages of autologous tissue repair, a subset of patients choose implant-based reconstruction after their initial preference for autologous reconstruction. A critical evaluation of patients who initially planned to undergo delayed–immediate reconstruction but later chose to continue with implant-based reconstruction has not been previously reported. A retrospective analysis of the senior author's (M.Y.N.) patients who initially intended to undergo delayed–immediate autologous breast reconstruction following mastectomy and chose to abandon autologous reconstruction in favour of prosthetic reconstruction was completed from 2005 to 2011. Seven patients (10 breasts) met inclusion criteria. The mean patient age and body mass index were 50.2 years and 32.1 kg m<sup>-2</sup>, respectively. Expansion required an average of 4.4 office visits to achieve adequate expansion volume, mean 483 ml (240–600 ml). The mean time from expander placement to definitive reconstruction was 14.6 months. Mean follow-up time was 20.4 months. Complications included infection (1/7), incisional dehiscence (1/7) and capsular contracture (2/7), and late revision surgery was performed in two patients. Successful reconstruction was achieved in 100% of patients (7/7) with a patient-reported satisfaction of 100%. Patient motivations for changing the reconstructive algorithm included a faster post-operative recovery in four patients (4/7) and potential donor-site morbidity in three patients (3/7). Depression or cancer-related fatigue symptoms were self-reported in 4/7. Avoiding donor-site morbidity and a simpler recovery

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are the main factors that influence patients to change their desire for autologous reconstruction to an implant-based reconstruction. Cancer-related fatigue and depression are prevalent in this population and may be implicated in a patient's desire to undergo less extensive reconstructive surgery. Allowing for the choice of definitive implant-based reconstruction in select patients is safe and is likely to result in high patient satisfaction with satisfactory aesthetic outcomes.

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Delayed–immediate reconstruction was introduced in 2000<sup>1</sup> as a way to stage the reconstructive process and allow for radiation therapy prior to definitive autologous reconstruction. Prior to the concept of delayed–immediate reconstruction, patients with anticipated radiation therapy (post-mastectomy radiation therapy; PMRT) had either an immediate autologous flap or a completion mastectomy without reconstruction. Both options can be associated with suboptimal outcomes.<sup>2</sup> In true delayed reconstruction, completion mastectomy removes a significant amount of native breast skin, which may negatively affect the final aesthetic outcome of the reconstructed breast. Additionally, the absence of the breast mound may have a negative psychological impact during the initial recovery period (prior to definitive reconstruction).<sup>1</sup> The changes induced by post-mastectomy radiation are well established.<sup>3–5</sup> Radiation-induced effects following immediate autologous reconstruction may result in flap shrinkage, higher complication rates and compromised aesthetic outcomes.<sup>4</sup> The direct effects of radiation on soft tissue include exacerbation of fat necrosis, skin contracture, and parenchymal fibrosis associated with a complication rate of 70% with a reoperation rate of 47%.<sup>2</sup>

Delayed–immediate reconstruction is another option when the surgeon or patient defers immediate autologous reconstruction. Autologous tissue reconstruction following radiation has been shown to provide superior aesthetic results when compared to prosthetic reconstruction.<sup>5</sup> Nevertheless, a subset of patients choose implant-based reconstruction after their initial preference for autologous reconstruction despite the cosmetic and long-term advantages of autologous tissue repair. Recent studies suggest promising results in select patients following implant-based reconstruction in the setting of PMRT.<sup>6,7</sup>

A critical evaluation of patients who initially planned to undergo delayed–immediate reconstruction but later chose to continue with implant-based reconstruction has not been previously reported. Changing the reconstructive plan and proceeding with definitive implant reconstruction in the setting of radiation therapy may be an overlooked benefit to the delayed–immediate algorithm. Therefore, the aim of this study is to review the reconstructive outcomes and factors that influence the decision-making process in this subset of patients.

## Patients and methods

Institutional review board approval was obtained for this study. A retrospective chart review was performed of the senior author's (M.Y.N.) delayed–immediate breast reconstruction patients from 2005 to 2011. All patients who

initially intended to undergo delayed–immediate autologous breast reconstruction following mastectomy met initial inclusion criteria. Patients were then identified based on their choice to abandon autologous reconstruction in favour of prosthetic reconstruction at any point during the reconstructive process. A chart review of each patient was then performed through the hospital's electronic medical record system. Patients who did not have follow-up at our institution or who pursued reconstruction elsewhere were excluded. Each patient's demographics, comorbidities, age and reconstructive details were reviewed. Breast cancer stage, radiation therapy, adjuvant therapy and hormonal therapy were also recorded. Primary outcomes included timing of reconstructive stages, complications and revisional surgeries. The motives for changing reconstructive algorithms were recorded as documented in the medical record during all follow-up visits.

## Delayed–immediate reconstruction algorithm

At our institution, delayed–immediate reconstruction is offered to patients who desire autologous breast reconstruction that will likely require PMRT for oncologic treatment. The first stage of reconstruction entails the placement of a temporary tissue expander at the time of mastectomy. This is routinely placed in the partial submuscular plane with acellular dermal matrix for lower-pole coverage. The tissue expander is routinely expanded to approximately 50–75% capacity prior to the initiation of radiation therapy. Following radiation therapy, re-appraisal of reconstructive goals and radiation of soft-tissue injury allows for appropriate counselling of surgical options. Patients sustaining significant radiation damage are encouraged to pursue autologous tissue reconstruction. However, in the setting of limited radiation damage with relatively supple native skin, the risks and benefits of prosthetic and autologous tissue reconstruction are discussed in detail, ultimately leaving the decision up to the patient.

## Results

A total of 59 patients met the inclusion criteria of participating in the delayed–immediate algorithm. Seven patients (12%), 10 breasts, opted for prosthetic over autologous reconstruction at some point during the reconstructive process. Each patient had planned to undergo definitive autologous reconstruction following the deformable image registration (DIR) algorithm. After

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