

Breast Reconstruction: An Actual Review

Daniela Fernanda Estrada Mercado¹, José Emiliano González Flores¹, Luis Miguel Canal de Velasco², Miguel De Hoyos Riebeling³, Alfonso Sandoval Polito¹, Abigail Bernal Chacha¹, Olga Lidia Hernández Sosa¹, Valery Dayan Tapia Ramírez¹, Jorge Noceda Crispin¹, María Fernanda Santos Sánchez¹.

¹Instituto Tecnológico y de Estudios Superiores de Monterrey ITESM Campus Ciudad de México

²Universidad Panamericana

³Centro Médico ABC

ABSTRACT

Breast reconstruction is recommended for patients diagnosed with breast cancer who require mastectomy, are candidates for breast-conserving surgery, or have genetic mutations necessitating prophylactic mastectomy. Reconstruction can be immediate or delayed, depending on patient preference and completion of cancer treatments like chemotherapy or radiotherapy. Immediate reconstruction involves placing a tissue expander or implant at the time of mastectomy, while delayed reconstruction can occur weeks or years later. Reconstruction techniques include the use of implants or autologous tissue, such as skin, fat, or muscle from areas like the abdomen, back, or thighs. Autologous reconstruction offers a natural result but requires two surgical sites and poses higher risks of complications. Flap procedures like TRAM and DIEP are commonly used, with careful consideration of patient comorbidities. The final stage of reconstruction involves nipple and areola reconstruction, typically using tattooing methods.

KEYWORDS: Breast reconstruction, autologous tissue, implants

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INTRODUCTION

Breast cancer is one of the leading causes of mastectomy in women, and breast reconstruction has established itself as a comprehensive option to restore both the appearance and confidence of patients. This intervention is indicated in cases of mastectomy due to cancer diagnosis, when conservation surgery is feasible, or in patients with high genetic risk who opt for a prophylactic mastectomy.

Breast reconstruction options fall into three main categories: the use of implants, autologous tissue, and a combination of both. Each technique offers different advantages, and its selection depends on the individual characteristics of the patient, her medical condition and aesthetic preferences, significantly improving her postoperative quality of life.

LITERATURA REVIEW

Breast reconstruction is recommended in three specific situations (1): 1) when there is a breast cancer diagnosis that requires a mastectomy; 2) when breast cancer is diagnosed and based on the characteristics of the tumor, the

patient is a candidate for breast-conserving surgery; 3) when a patient diagnosed with breast cancer has genetic mutations and will undergo a prophylactic mastectomy.

Breast reconstruction is entirely elective, and in Mexico it forms part of the comprehensive treatment offered to patients with breast cancer. Some patients may choose not to undergo immediate reconstruction for various reasons, and this is an important consideration if they later decide to pursue reconstruction, as the surgical plan may need to be modified for reasons that will be discussed later. When breast reconstruction is performed immediately following a mastectomy, it is referred to as immediate reconstruction or first-stage immediate reconstruction (1). When a patient does not wish to undergo immediate reconstruction, the surgery can be offered weeks, months, or even years later. This is referred to as delayed reconstruction or first-stage delayed reconstruction (1). It is important to note that in order to perform immediate reconstruction, a histopathological study must confirm negative axillary lymph nodes during the mastectomy. Additionally, the patient must have completed any other breast cancer treatments, such as chemotherapy or

Breast Reconstruction: An Actual Review

radiotherapy, or the reconstruction can be done once the patient decides to proceed (2). When immediate reconstruction is performed, the reconstruction process is initiated but not yet complete. Reconstruction options can be divided into three main groups: implant-only, use of autologous tissue (patient's own tissue), and a combination of implant and autologous tissue (1).

Reconstruction with implants offers an aesthetically acceptable result without the need to use tissue from other parts of the body. Immediately after the mastectomy, a tissue expander is placed in the skin pocket at the site of the defect. This expander can be positioned either submuscularly, behind the pectoralis major muscle, or supramuscularly, in front of the pectoralis major muscle. In selected patients, an implant may be placed directly instead of using a tissue expander, as long as the patient's conditions allow, such as when there is good skin and muscle coverage to close the edges (2,3). The tissue expander (**Figure 1**) is a silicone balloon with a metallic ring that can initially be placed either without any solution or with 30 ml of saline. Saline solution is gradually added to the expander during outpatient visits, using a magnet to locate the metallic component of the expander where the saline is injected, depending on the dermal coverage over the tissue expander. The purpose of placing the submuscular tissue expander is to create the necessary space so that a breast implant can eventually be inserted during a second surgical procedure. The duration of the expansion protocol is typically individualized, depending on the patient's adherence to expansion appointments, discomfort or pain during the expansion process, the amount of saline added during each visit, and the preferences of both the patient and the plastic surgeon. Once the desired space has been created, a second surgery is scheduled to remove the expander and replace it with a silicone implant (**Figures 2A and 2B**). The physical properties of the expander are firmer compared to the silicone or saline implant, which is softer (4).



Figure 1. Breast tissue expander, highlighting the metallic part where the injection is made during the expansion protocol.



Figure 2A. Smooth silicone breast implant removed after 12 years of use.



Figure 2B. Textured silicone breast implant removed after 7 years of use.

The use of one's own tissue, known as autologous reconstruction, involves taking tissue (skin, fat, or muscle) from another part of the body to rebuild breast density. The regions that can be used include the abdomen, back, thigh, or buttock. Every flap procedure will leave a periumbilical scar, at the mastectomy site, and along the lower abdomen. When the blood supply is maintained from its original source through rotation, these are called pedicled flaps. However, when the blood supply is detached and reconnected to a new source closer to the chest, it is referred to as a free flap (1). This type of reconstruction involves two surgical sites and, therefore, two areas of scarring with potential complications: one at the chest and one at the donor site from which the tissue is taken. Various patient comorbidities may influence the decision-making process for choosing this type of reconstruction, such as the patient's weight, smoking habits, diabetes, among others. Reconstructive options include using abdominal tissue (stomach), which can achieve sufficient breast density. In this technique, the rectus abdominis muscle is supplied by the deep superior epigastric artery and vein, as

Breast Reconstruction: An Actual Review

well as the deep inferior epigastric artery and vein, which contain smaller vessels or perforators. These perforators pass through the rectus abdominis muscle to supply blood to the fat and skin layers (1). The different types of abdominal flaps that can be used to recreate breast density are: 1) The free transverse rectus abdominis myocutaneous (TRAM) flap (**Figure 3**), where the flap is disconnected from its blood supply and reattached to the blood supply in the chest. This flap consists of skin, fatty tissue, and muscle, with or without fascia. 2) The free TRAM flap with muscle preservation, where the original blood supply is disconnected and reconnected to the thoracic blood supply. The flap consists of skin, fatty tissue, and a small amount of muscle, with or without fascia (most of the fascia and muscle remain untouched) (5). 3) Deep inferior epigastric perforator (DIEP) free flap (**Figure 4**), where the flap is disconnected from its original blood supply and reconnected to the thoracic blood supply. It consists of skin, fatty tissue, and the deep inferior epigastric artery and vein along with their perforators. No fascia or muscle is taken (6). 4) Superficial inferior epigastric artery (SIEA) free flap, where the flap is connected to a new thoracic blood supply. It consists of skin, adipose tissue, and the superficial inferior epigastric artery and vein along with their perforators. Due to the size of the artery and vein, this technique can only be used in 1 out of 5 patients. A potential drawback is the need for a prosthetic mesh to prevent intestinal protrusion, as significant resection of the fascia layer may be required for this type of flap. Additionally, Doppler ultrasound monitoring is necessary to assess blood flow in the flap and to detect any early signs of necrosis, which occurs in 5% of cases. Other tissue sites, such as the thigh or gluteal area, can be used for patients who do not have sufficient abdominal tissue, have enough tissue in the thigh or gluteal area to reconstruct a breast without causing significant depression of the gluteal region, or are unable to use abdominal tissue due to previous surgeries (2,3,6).

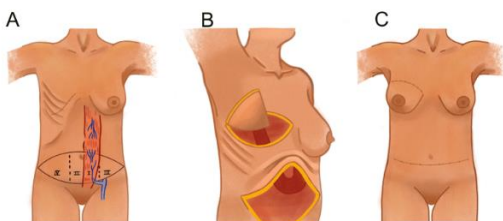


Figure 3. TRAM flap with muscle preservation. (A) Areas of the abdomen that are divided into zones I-IV according to their blood supply, with the central ones I-II being the most vascularized and III-IV the least irrigated, taking as reference the rectus abdominis muscle. (B) Flap consists of skin, fatty tissue, and a small amount of muscle, with or without fascia. In this case, the rectus abdominis muscle is preserved with the flap. (C) Aesthetic results are favorable by achieving a breast with density similar to the contralateral one and with a natural appearance. Acceptable results are achieved with tattooing of the areola and reconstruction of the nipple, as well as the presence of abdominal surgical wound.

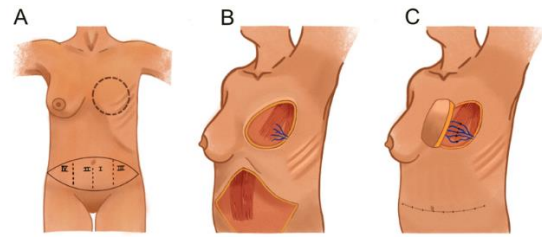


Figure 4. Deep inferior epigastric perforator (DIEP) free flap. (A) Areas of the abdomen with similar irrigation as the TRAM flap with muscle preservation, the circle represents the presurgical marking. (B) No fascia or muscle is taken, but the perforating arteries does. (C) Anastomosis of the flap vasculature with the vasculature of the dorsal muscle is performed.

The use of implants and autologous tissue can be performed using the latissimus dorsi muscle (**Figure 5**), which is in the back and covered by a portion of skin and fat, collectively referred to as a skin island or skin flap. This procedure is known as the latissimus dorsi flap (**Figures 6, 7A, and 7B**), where the skin island is harvested from the back and moved to the front of the chest. In cases where the patient does not have enough fatty tissue in the back to create a breast with a similar density using only the latissimus dorsi flap, an implant or tissue expander may be used. If a tissue expander is needed under the latissimus dorsi flap, the expansion protocol mentioned earlier is followed, and a second surgery is scheduled to remove the expander and place the implant.

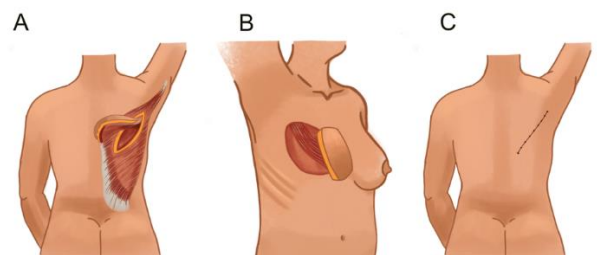


Figure 5. (A) Cutaneous island before passing through the axillary tunnel to the anterior chest compartment. (B) From an anterior view, Skin Island prepared to cover breast defect. (C) Surgical wound from taking the latissimus dorsi flap.



Figure 6. Skin island in a latissimus dorsi flap.

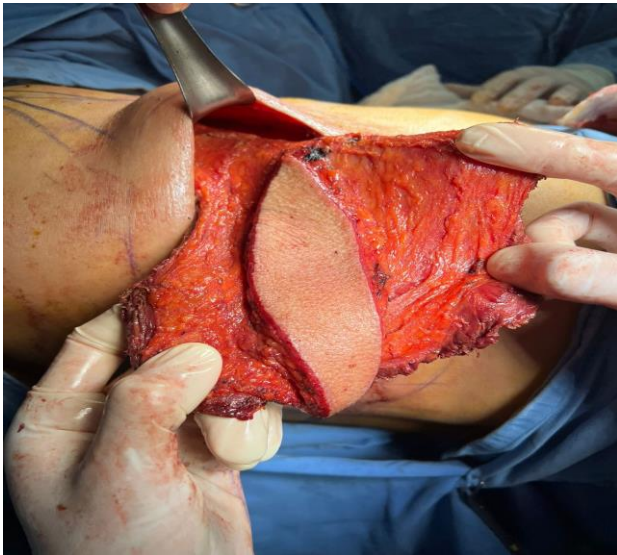


Figure 7A. Skin island in a latissimus dorsi flap showing the extension of the latissimus dorsi muscle, which will be placed in the breast defect through an axillary tunnel.

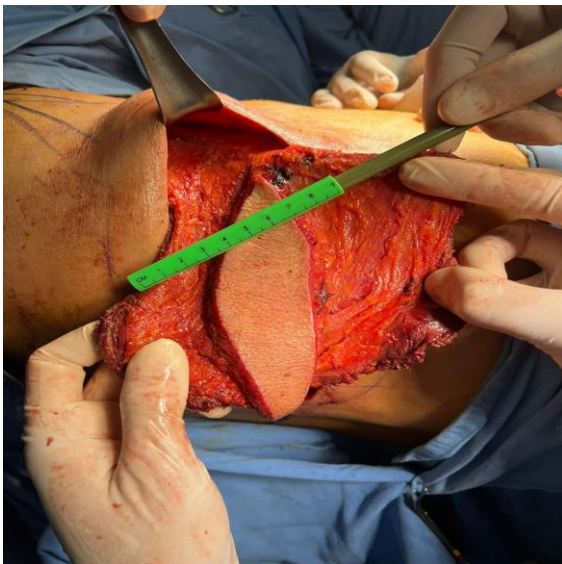


Figure 7B. Skin island in a latissimus dorsi flap showing the extension of the latissimus dorsi muscle, which will be placed in the breast defect through an axillary tunnel.

At the final stage of the reconstructive process, the nipple and areola can be reconstructed. It is important to note that the reconstructed nipple will not be the same as a natural one; it will not respond to temperature or touch and will lack

sensitivity. The areola can be created using tattooing techniques.

CONCLUSION

Breast reconstruction techniques have advanced significantly, offering a range of options from implants to the use of the patient's own tissue, such as abdominal flaps. Flap techniques, like the DIEP or TRAM, provide a more natural reconstruction in terms of shape and texture, though they involve two surgical sites. Patients must be carefully evaluated to determine the best option based on their medical conditions and the type of mastectomy, ensuring the best possible aesthetic and functional outcomes.

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