

PATIENT SELECTION AND TRANSVERSE RECTUS ABDOMINIS MYOCUTANEOUS FLAP COMPLICATIONS: A LITERATURE REVIEW

Seleção de pacientes e complicações do retalho miocutâneo do músculo reto abdominal: revisão de literatura

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ABSTRACT

Introduction: Breast cancer is the most prevalent malignant neoplasm in women. Due to delayed diagnosis, a modified radical mastectomy is the surgical treatment of choice for a large proportion of patients with the disease. Breast reconstruction with myocutaneous flaps is the technique that offers the best long-term results. The TRAM (transverse rectus abdominis myocutaneous) technique has been improved in the last 30 years, and its main advantage is its use of large volumes, which gives the new breast contour and a more natural consistency. **Objective:** Review the literature on the reconstruction technique with the TRAM flap, focusing on technique, patient selection and the main complications. **Results:** The main indications regarding reconstruction with TRAM refer to cases with extensive defects after immediate or delayed mastectomy, or when there are major consequences from radiotherapy or failure in other reconstructions. Strict criteria must be adopted in the selection of these patients, especially with regard to their comorbidities. The proper selection of patients can reduce a series of complications arising from the method. **Conclusion:** TRAM is an excellent option for immediate or delayed breast reconstruction as long as the patients are well selected. It eliminates (or at least reduces) the need for implants and their possible implications and additionally gives a more natural format to the reconstructed breast by accompanying the patient's weight fluctuations. However, this technique is not free of complications, especially with regard to donor areas and the patient's need for longer surgical and recovery time.

KEYWORDS: Myocutaneous flap; breast.

RESUMO

Introdução: O câncer de mama é a neoplasia maligna mais prevalente em mulheres. Em decorrência do diagnóstico tardio, a mastectomia radical modificada permanece como o tratamento cirúrgico de escolha para grande parte das pacientes portadoras da doença. A reconstrução mamária com retalhos miocutâneos apresenta os melhores resultados em longo prazo. A técnica do TRAM foi aperfeiçoada nos últimos 30 anos e tem como principal vantagem a utilização de grandes volumes, dando à nova mama contorno e consistência mais naturais. **Objetivo:** Revisar a literatura a respeito da técnica de reconstrução com o TRAM, enfocando as indicações da técnica, a seleção de pacientes e suas principais complicações. **Resultados:** As principais indicações da reconstrução com TRAM referem-se a casos de defeitos extensos após mastectomia imediata ou tardiamente, ou quando existem sequelas importantes de radioterapia ou falha em outras reconstruções, devendo-se ter critérios rigorosos na seleção dessas pacientes, principalmente no que diz respeito às suas comorbidades. A adequada seleção de pacientes pode reduzir uma série de complicações advindas do método. **Conclusão:** O TRAM é uma excelente opção para a reconstrução mamária imediata ou tardia, desde que as pacientes sejam bem selecionadas; elimina (ou, pelo menos, reduz) a necessidade de implantes e suas possíveis implicações, além de dar formato mais natural à mama reconstruída, acompanhando as flutuações de peso da paciente. Entretanto, essa técnica não está isenta de complicações, principalmente na área doadora, além de demandar tempo cirúrgico e de recuperação maiores.

PALAVRAS-CHAVE: Retalho miocutâneo; mama.

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INTRODUCTION

Breast cancer is the type of cancer that most affects women in Brazil and around the world. Because of its high incidence, this neoplasm is a major public health concern, especially because of the psychological and social impacts it has on women. Living with a stigma-related illness, suffering prejudice, and constantly living with uncertainties and the likelihood of recurrence are extremely distressing situations.

The surgical treatment of breast cancer has changed a lot in recent decades. Nevertheless, due to delayed diagnosis, a modified radical mastectomy continues to be the most performed intervention. The removal of this organ, in conjunction with adjuvant therapies, contributes to the development of physical complications and psychological disorders that negatively influence the patient's quality of life^{1,2}.

Missing a breast alters a woman's body image and produces a feeling of mutilation, and loss of femininity and sensuality. In an attempt to reduce the negative feelings triggered by the disease and its treatment, to improve self-esteem, to supplement the lack of breast and to facilitate getting dressed, breast reconstruction has gained more and more momentum, taking on an important role. It is a safe procedure that does not increase the risk of recurrence of the disease, does not interfere with its detection, and does not delay adjuvant therapies^{1,2}.

Although 35-40% of women diagnosed annually with breast cancer undergo a complete mastectomy, historically less than 25% of them undergo immediate reconstruction³⁻⁵.

There are several breast reconstruction techniques, including procedures with local flaps and mammoplasty, the use of alloplastic materials (tissue expanders and prostheses), autologous flaps, in addition to combined techniques. No procedure is superior to the others in all matters, however, the patient benefits when there is a meticulous choice made based on the surgeon's experience, the patient's desires and, mainly, the indications and contraindications of each technique.

Breast reconstruction has made great progress in the last few decades due to the improvement and the development of new techniques. A better understanding of the anatomy of cutaneous vascularization, associated with the transfer of vascularized tissues at a distance, gave surgeons new options for the treatment of patients with breast cancer⁶. In this context, the use of myocutaneous flaps - in particular the rectus abdominis muscle flap (TRAM) - is prominent among modern reconstructive surgery and has become the most commonly used autogenous tissue donor area for breast reconstruction⁷⁻¹¹.

In 1977, Drever published the first version of the vertical rectus abdominis report¹². In 1979, Holmström¹³ first used TRAM for breast reconstruction. In the same year, Robbins¹⁴ described this flap as a pedicle. However, the method was only popularized in 1982 by Hartrampf et al.¹⁵, who first described the TRAM pedicle flap for breast reconstruction.

The TRAM flap offers numerous benefits over conventional techniques. It allows for the use of large volumes and greater flexibility in the assembly of the flap. It gives the new breast more natural contours and consistency. It produces better long-term results and eliminates (or at least reduces) the necessity of using implants.^{7,16,17} More than 90% of women demonstrate satisfaction with the aesthetic result provided by the TRAM technique¹⁸.

TRAM is considered the technique of choice for breast reconstruction with autologous tissue, and does not seem to reduce the effectiveness of oncologic treatment^{8,19}.

Although it is a very accepted procedure, there still exist complications, which continue to be a problem in breast reconstruction.

The complications associated with breast reconstruction using TRAM can be grouped into two categories: relating to the flap and relating to the donor area. Systemic complications, such as deep venous thrombosis, pulmonary embolism, infection or loss of fluids will not be described in this study.

The objective of this study was to review the literature on the TRAM flap technique, emphasizing the main indications with regard to the method, the selection of patients and the main complications.

MATERIALS AND METHODS

A bibliographical survey was performed in books and electronic databases, including SCIELO, LILACS and PUBMED, with the descriptors: TRAM Flap, Breast Reconstruction, Oncoplastic Breast Surgery, Indications, and Complications. We found a total of 62 articles. Those included in the review were published after the year 2000 and were clearly associated with the proposed subject matter. They were selected by reading the title and the abstract. Articles that did not meet the above inclusion criteria were excluded.

RESULTS AND DISCUSSION

A description of the technique

The TRAM flap consists of the use of excess skin and tissue from the infraumbilical region on the rectus abdominis muscle in conjunction with the muscle. As such, it allows for the re-sectioning of large volumes. To have a flap, it is necessary to have a receiving area - which is the site of a previous mastectomy - and a donor area with good vascularization. When preparing the recipient area, the preservation of the inframammary fold is essential to make a shape that is symmetrical to the contralateral breast, in addition to a mammary storage place to receive the flap adequately and sufficiently. The anatomical concept of TRAM is based on the superior epigastric arteries, which allow for flap irrigation.

The donor region is defined by the cutaneous fold formed, which starts from the suprapubic region and goes up until both

the anterior-posterior iliac crests. The ends of these lines attach to another line, passing through the upper border of the umbilical scar. Thus, the donor area appears to be an ellipse of dermal fat tissue in the infraumbilical region. Defining the donor area depends basically on its irrigation. Initially, Hartrampf et al.¹⁵ divided the lower abdomen into four zones: the first, referring to the rectus abdominis muscle; the second, referring to the region on the contralateral rectus abdominis muscle; the third, the lateral portion of the flap ipsilateral to the chosen muscle; and the fourth, the portion of the most distant flap in the contralateral region.

Contemporary studies have shown the best perfusion in the zone ipsilateral to the rectus abdominis muscle of interest in relation to the contralateral region of the flap. As such, the interval between zones II and IV²⁰ is suggested. Therefore, it is believed that the best irrigation of the lower abdominal flap is first performed by the perforating vessels coming out directly from the abdominal muscle (zone I), followed by the adjacent ipsilateral lateral region (zone II), the adjacent contralateral region (zone III) and finally by the contralateral lateral portion of the flap (zone IV). This area (zone IV) should be neglected in most single-pedicle reconstructions because of their low perfusion.

The rectus abdominis muscle can be chosen on either side or even used bilaterally as needed. The ipsilateral vascularization in single-pedicle flaps is better than in contralateral ones and, in addition, there is an improvement in the aesthetic result of the abdominals, because it avoids epigastric bulging of the rotating muscle. Either way, each case requires that the surgeon perform a thorough study to define the best options and the best plan for the patient. It is noteworthy that the dermal tunnel upon being prepared - and where the pedicled flap will be displaced - should be located in the medial portion of the inframammary sulcus. It will communicate the recipient storage with the upper abdomen.

The venous drainage is made by the superior and inferior epigastric veins, which anastomose by inosculation inside the muscle. The presence of valves in the deep venous system is described. They are faced upwards in the superior veins and face downward in the inferior veins. This fact could cause drainage damage of the flap when raised with a superior pedicle. Denervation of the rectus abdominis is inevitable and causes muscle atrophy. It happens from the last intercostal branches and by the ileo-hypogastric nerve. The flap is de-epithelialized and excess tissue is discarded. The abdominal wall is reconstructed with a Márlex® screen, and suction drains are placed in the breast and abdomen.

Indications and the selection of patients

Reconstruction with TRAM is indicated in cases of extensive defects after a mastectomy - in immediate reconstructions, when there is a need for a large replacement of skin after a mastectomy, and in the delayed ones, when there is need for skin or when there are severe consequences of radiotherapy in the

thoracic wall. Furthermore, the procedure is indicated in cases with a failure in reconstruction with prostheses - as in cases of severe capsular contracture or implant loss. Finally, it is indicated in cases with a failure in reconstruction with a large dorsal flap and in patients with a protruding abdomen and who have a preference for the technique.

Patients with prior surgery in the upper abdomen and who have lesions of the superior deep epigastric vessels - such as open cholecystectomy - or surgeries that injure the subcutaneous perforation of the flap - such as abdominoplasty and very extensive liposuction, are not recommended to have the procedure. Additionally, those that do not have a sufficient donor area, wish to become pregnant, have decompensated diabetes or are morbidly obese, are not indicated for the procedure.

Patients that smoke are at an increased risk of superficial necrosis of the flap, abdominal necrosis and hernias, when compared to nonsmokers^{21,22}. Eberlein et al. described 7% of partial losses in 101 patients submitted to TRAM reconstruction. All losses correlated with heavy smoking²³. When patients stop smoking at least three weeks before surgery, the incidence of complications decreases significantly²².

Relative contraindications may be related to the patient's activities. For example, sports and work activities that require the use of physical strength should be evaluated with caution. Comorbidities such as vasculopathies, diabetes, collagenases, obesity, chronic debilitating diseases, and inability to withdraw from usual activities for a long period of time are also considered to be contraindications.

Complications

One of the major advantages of using the TRAM flap is that it does not require the use of a prosthesis, thus avoiding many of the complications associated with the procedure, such as infection, capsular contracture, exteriorization and possible need for a posterior replacement^{24,25}.

As a reconstruction technique that exclusively uses autologous tissue, the TRAM flap allows for a more natural breast with regard to touch and appearance^{8,24-27}. Moreover, it alters its size with variations in weight^{10,24}, just as it would with the normal breast²⁴ in the course of the aging process⁹.

Furthermore, it requires a smaller number of procedures to revise and restore symmetry of the breasts when compared to prosthetic reconstruction techniques¹¹. In this surgical technique, the patient is submitted to an abdominoplasty with transposition of the navel (determined by the way the tissue is removed for reconstruction), which may be pleasing to many because it improves the contour of the abdominal region^{24,28}. This procedure usually results in a scar that is scarcely visible and can be kept in a very low position, near the pubic symphysis⁸.

With regard to the complications resulting from the technique, they may affect the donor area or the flap used in the

reconstruction. As for donor area morbidity, complications such as abdominal hernias, bulging, abdominal wall rejection or infection, dehiscence, weakness of the abdominal wall and its interference with daily activities have been debated since the introduction of TRAM^{19,29-31}.

According to Ascherman et al., the rates of abdominal complications resulting from the use of TRAM are low, and as such, the procedure continues to be a good option for women seeking breast reconstruction²⁵. The bipedicle flap is safer in relation to its vascularization, but it results in higher rates of donor area complications.

With regard to the morbidity of the flap, compromising its vascularization is perhaps the greatest fear, since it involves the rotation of a pedicled flap, which can occur both through irrigation deficiency and through venous stasis. This impairment may occur to varying degrees, from a small portion of dehiscence of the surgical borders to partial or complete necrosis of the flap. In addition, hematoma formation and infection may occur.

Patients with a history of smoking, in addition to patients that are diabetic, obese or overweight are at an increased risk of complications of the flap^{9,32}. This technique can only be used when there is enough abdominal fat to rebuild the breast.

In very thin patients, the use of flaps from the abdomen is not a good choice²⁴.

The use of a TRAM flap involves a more complicated surgery. It is more time consuming and results in greater blood losses. Thus, hospitalization and the postoperative recovery period are generally longer than in other reconstruction techniques^{19,28-31}. Patients are hospitalized for five to seven days. Returning to usual activities may take two to four months⁹.

CONCLUSION

Although autologous breast reconstruction using TRAM has longer surgical and recovery time, the technique usually requires fewer revisions and procedures to make the breasts symmetrical. Additionally, it is considered to be oncologically safe and have few serious complications.

TRAM is an excellent method for breast reconstruction in previously selected patients, since, at first, it does not require the use of implants and gives the reconstructed breast a very similar appearance to that of a natural breast.

Appropriate selection is the main key to the success of the surgery, for it is important to consider the patient's desire and lifestyle, as well as the presence of associated pathologies.

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