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Special article

Oncoplastic techniques in the management of central breast cancer

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ARTICLE INFORMATION

Article history:
Received January 24, 2008.
Accepted April 22, 2008.

Keywords:
Breast neoplasms
Oncoplastic surgery

A B S T R A C T

Central tumors of the breast are in a difficult location for breast conservation that in many occasions had resulted in mastectomy. At the present time, the use of oncoplastic techniques have increased conservative management in this group of women, with an adequate oncological resection and good aesthetic results being achieved. This article describes oncoplastic procedures for the removal of breast central tumors with special interest in conservation and reconstruction of the areola-nipple complex.

Técnicas oncoplásticas para el manejo de tumores centrales de mama

Palabras clave:
Cáncer de mama
Cirugía oncoplástica

R E S U M E N

Los tumores centrales de mama están en una localización conflictiva para la conservación mamaria, que en muchas ocasiones se ha resuelto con la mastectomía. Actualmente, la introducción de procedimientos oncoplásticos permite incrementar la indicación conservadora en este grupo de mujeres, con lo que se alcanza una resección oncológica adecuada y un buen resultado estético. Este artículo describe los principales procedimientos oncoplásticos para la extirpación de tumores centrales de mama, con un interés especial en la conservación y la reconstrucción del complejo areola-pezón.

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Introduction

Central tumours of the breast are processes that have traditionally been excluded from conservative treatment based on the uncertainty of local control and the assumed unacceptable aesthetic deterioration for the woman. Currently, these classical paradigms must be clarified, since central extirpation followed by irradiation offers the same guarantees as breast-sparing surgery in peripheral tumours with a 5-year recurrence rate under 8%.[1]

Traditionally, mastectomy has been the main surgical alternative in this patient group, based on the belief in greater oncological control and a better final aesthetic result. Nevertheless, it is reasonable to currently offer breast-sparing surgery as a safe alternative in the treatment of central tumours and, in some cases, it can be accompanied by breast remodelling procedures and reconstruction of the nipple-areola complex (NAC).[2,3] This oncoplastic alternative has several advantages for the woman faced with mastectomy. On the one hand, conservative techniques maintain skin sensitivity, which allows the woman to better adapt to a new postoperative state. The entire content of the breast feels like her own, which is a different feeling in comparison to that following breast reconstruction, in which the absence of sensitivity leads to accidents and a lack of a sense of identity. A second aspect is maintenance of body image thanks to the presence of the previous breast contour, preservation of the NAC in a high percentage of cases or the possibility of reconstructing it when forced to remove it. Hospital management is easier with the conservative option, with a minimal hospital stay of 24-48 hours (even on an outpatient basis for some procedures), which improves incorporation of the woman into her family and social life, reducing the psychological impact of the process and improvement in the efficiency of the healthcare system. Finally, the conservative option preserves the latissimus dorsi muscle for future needs related to the appearance of metachronous tumours.

This article addresses conservative management in women with central tumours of the breast and explains the procedures that are necessary for planning and breast remodelling, with special attention paid to conservation and reconstruction of the NAC.

The Conflict: Preservation of the NAC

Preservation of the NAC is one of the most important decisions during an oncoplastic procedure in the woman with a central tumour in the breast due to the great importance that this structure has for body image and local control of the process. The conflict for its preservation lies in the degree of damage of the structure and the adjacent tissue, both in the procedures that conserve it in situ as well as in those that use it as a free graft. Interest in preserving this anatomic structure has increased studies on mastectomy specimens for the purpose of selecting patients with a low probability of neoplastic involvement of the NAC, thereby increasing oncological safety in preserving or re-implanting it. These studies[3-11] have shown, on the one hand, that neoplastic invasion of the areola is exceptional (<1%), since it does not contain mammary parenchyma ducts and, on the other, that involvement of the NAC presents in 3 anatomical patterns (Figure 1):

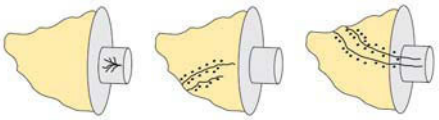

Figure 1 – Patterns of neoplastic involvement of the subareolar tissue and nipple in central tumours of the breast. Carcinomatous conditions of the NAC present in 3 main varieties. In the first (A), only the lactiferous ducts of the nipple are involved, which manifest as Paget's disease when the epidermis is affected directly and there is ulceration. A second variety (B) consists of involvement of the subareolar tissue without involvement of the lactiferous ducts of the nipple. Finally, there are situations (C) in which involvement spreads through the subareolar parenchyma to the nipple.

– Involvement of the nipple only. This involves neoplastic changes in the nipple regardless of the original tumour. This is the least common form (less than 2%) and it may be considered the same as Paget's disease, that is, a condition of the final pathway of the lactiferous duct at its opening in the nipple without intermediate disease to the original tumour

– Involvement of the subareolar tissue. This is the most frequent form (21%) and it is related to direct extension of the tumour (by proximity) and lymphatic dissemination. In these circumstances, preservation of the NAC is only possible with a section of the surgical sample over the neoplasm, confirmed by microscopic examination of the borders. In these cases, in order to preserve the NAC, it is advisable to remove it and re-implant it as a free graft

– Involvement of the subareolar tissue and the nipple. In these cases, the disease directly affects the final branch of the lactiferous duct in the nipple (13% of surgical samples), which makes preservation and/or reimplantation of the NAP unadvisable. In the majority of cases, there is a tumour proximal to the NAC and it is involved by continuity. In other cases, it involves multifocal processes with an increased in situ component in which dissemination occurs through the lactiferous ducts themselves. These patients are not candidates for NAC preservation or reimplantation and they would be better served by reconstruction using elements provided by an advancement flap (Grisotti-type). A second option is preservation of the areola, only when it is not involved, and reconstruction of the nipple using the skin provided by a local flap

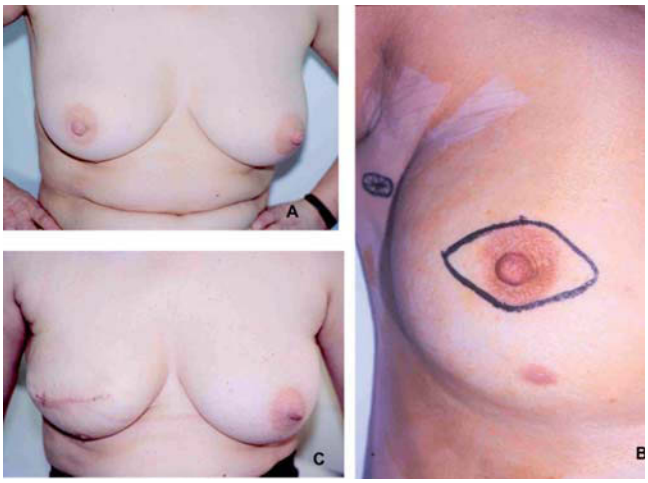

Figure 2 – Elliptical excision. This 49-year-old woman sought medical attention because of a 1-month history of retraction of the right breast (A). The radiological study confirms a 1.1 cm retroareolar carcinoma, and a central quadrantectomy and sentinel node biopsy is proposed (B). The final aesthetic result is acceptable and no asymmetry or deformities are seen (C).

Figure 3 – Removal of the NAC and purse-string closure (modified from Huemer et al[16]). In this technique, an incision is planned 2-3 mm from the edge of the areola (A). After excision of the NAC and the subareolar tissue, the central defect is closed using a concentric approximation of the borders of the wound (B). This approximation may be performed by placing a purse-string suture over the epidermal surface (C), whereby tensioning it allows for concentric closure of the wound (D).

Central Resections Without Breast Remodelling

Elliptical Excision

This procedure is indicated in tumours with direct involvement of the NAC or in those cases in which reconstruction after removal is not feasible. With this design, we can include all central tumours, as well as those that are displaced laterally and medially.[12,13] Nevertheless, tumours that are located in the vertical axis of the NAC outside of the pattern, whether cranially or caudally, may be resected using this same design whenever the skin is not affected. The resection pattern consists of an elliptical section oriented around the mammary equator and adjusted to the diameter of the NAC with the goal of preserving the maximum amount of skin possible. In this way, it faithfully maintains the original shape of the breast (Figure 2). From an aesthetic point of view, the elliptical excision will lead to a loss of breast projection that will be more pronounced the more volume that is resected.

The appearance of local recurrences is rare since this technique removes the most troublesome border in mammary preservation: that directed towards the NAC.[14,15] However, we should keep in mind that the incidence of local recurrences is similar to the incidence of peripheral tumours and its risk factors coincide with those found with other conservative techniques (border width, histology).

Concentric Excision

This technique is indicated in the same context as the above procedure, as are the majority of its adverse events. In its planning, a pattern is made over the outline of the NAC, making its outline 1-2 mm from the outside border of the areola.[16] From this pattern, the NAC is removed together with the tumour and the adjacent tissue using the same criteria as those shown in the elliptical excision. During closure, dissection of the dermoglandular flaps should be concentric with the goal of freeing the entire circumference of the cutaneous border, thereby permitting its closure. Once the dermoglandular flaps are made, they are approximated in order to finally affect subcutaneous sutures at the epidermal border with the goal of closing the wound concentrically (Figure 3).

Central Resections With Breast Remodelling

A significant number of women with central tumours will require extensive breast remodelling as the only alternative for preservation of their breast. In recent years, different authors have proposed different remodelling techniques in the management of central tumours in an attempt to improve the aesthetic result and optimize the viability of the NAC.[17-20] This wide variety of options in the therapeutic arsenal allows for selection of a different technique for each clinical situation, improving surgical results and body image, and sharing the common focus of all oncoplastic techniques: the onco-anatomical approach to disease. However, this variety of techniques makes its description and methodology difficult since the majority of these procedures are sporadic events based on personal experience. Despite this difficulty, we will try to systematize their description based on the points they share in common when making decisions in this group of patients and we can basically summarize them into 5 sections: its indication, pattern selection, forming the inferior

pedicle, decisions on the NAC and complementary surgery on the healthy breast in order to achieve symmetry.

Indications for Breast Remodelling in Central Tumours

The first decision with these patients is to evaluate if they are good candidates for a breast remodelling procedure. There are 2 contexts in which breast remodelling is most indicated in the management of central tumours. The first is that which involves the common problem in all conservative surgery: the discrepancy between the volume of the resection and the size of the breast. Therefore, planning an extensive tissue resection will impede local removal with an elliptical pattern, as described earlier, and will require mobilisation of tissue in order to permit the central defect to be closed without deformities. In this context, the remodelling technique is mostly indicated in multifocal processes that affect extensive areas of the central region of the breast. These patients, who traditionally have been treated with mastectomy, can be afforded a last opportunity for breast-sparing surgery by using these remodelling techniques.

The second group of indications should revolve around the anatomical context of the breast. The majority of these remodelling procedures are vertical mammoplasties and a minimal amount of ptosis is required in order to carry them out. Using these criteria, these procedures are contraindicated in women with low volume breasts without ptosis and they should be evaluated for other procedures.

Pattern Selection in Central Tumours

The second decision focuses on selecting the most suitable pattern for the patient's onco-anatomical situation. As mentioned previously, these procedures are based on the design of vertical patterns, whether they have a single or a double skin (the classical Weis pattern). The choice of pattern depends primarily on the breast's anatomical characteristics; therefore, the single-skin pattern is indicated in medium breasts with moderate ptosis since breast remodelling will provide the best results in these circumstances. The primary advantage of this pattern versus the double-skin pattern is its lower level of technical complexity and the speed with which it is performed, leading to decreased surgical time and a low rate of postoperative complications. However, for a voluminous breast and/or one with moderate/severe ptosis, a double-skin onco-reductive mammoplasty is recommended since this procedure can significantly reduce the breast volume and sagging which will optimize postoperative irradiation.

The pattern design follows the same principles that have been explained in the chapters that correspond to vertical mammoplasties. In both cases, a cutaneous islet should be planned in the superior third of the pedicle in order to close the central defect. This central islet can also be used as a surface for reimplantation of the NAC once this area has been de-epithelialized.

Decisions About the NAC

The third decision in this group of patients, perhaps the most important one for the woman's body image, is related to final restoration of the NAC. In this context, 2 fundamental decisions are made: whether or not to reconstruct the NAC and the choice of restoration elements. Regarding the first question, there are 2 technical approaches: those that do not include reconstruction of the NAC and those that are performed through reconstruction or reimplantation.

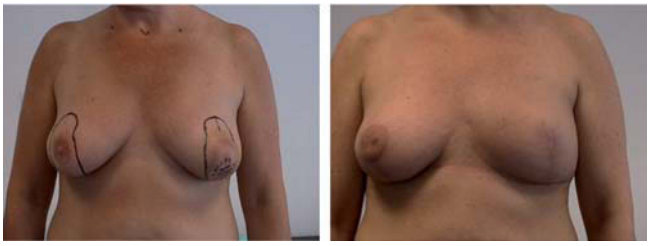

Figure 4 – Vertical mammoplasty without NAC reconstruction. This 48-year-old patient has been diagnosed with left-sided invasive ductal carcinoma without areolar involvement. After removal of the NAC, the left breast was remodelled using a single skin vertical pattern without reconstruction of the NAC and right-sided symmetry was achieved using the same pattern.

When the final decision is made to not reconstruct the NAC, direct closure of the pattern's vertical branches can be made in order to avoid creating "dog ears" in the superior border of the wound (Figure 4). This option in simpler, provides adequate volume without deformities and is well accepted by a significant number of women. Afterwards, reconstruction of the NAC can be performed using a free graft of skin in the area of maximum breast projection and at a similar height as the NAC of the contralateral breast. A second technical option is to recreate the areola from a cutaneous disc from the inferior pedicle, which provides a body image that is very similar to the original NAC. This is a technique that is feasible to the majority of surgeons, well accepted by patients and allows the skin to be tattooed later in order to recreate the new areola (Figure 5). This procedure comes in 2 primary varieties. The first is the application of the advancement flap concept to a double-skin vertical pattern (Figure 6) and the second is inclusion of the areola in the flap's cutaneous disc, a technique that is feasible in women with large diameter areolas and which provides the best aesthetic result possible with this procedure (Figure 7).

The technical option is made up of a group of procedures that try to preserve the image of the NAC during the same surgical procedure, whether through reimplantation of the original NAC or by reconstructing it with cutaneous elements. The first option is simpler from a technical point of view, though there is an essential step to be taken when carrying it out, choosing an adequate surface, since the success of the reimplantation will depend on its quality. For this, the dermoglandular tissue or a de-epithelialized surface from the inferior mammary pole can be used (Figure 8). This last option constitutes the best anatomical element for reimplantation and may be easily fashioned from a Grisotti-type advancement flap.

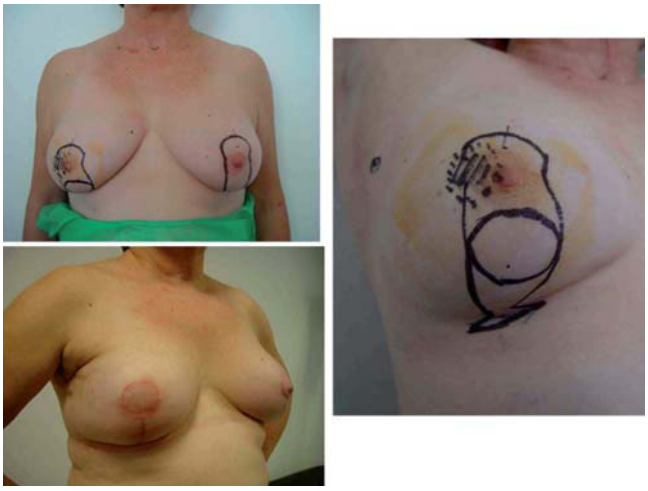

Figure 5 – Grisotti technique. This 51-year-old woman has been diagnosed with invasive ductal carcinoma in the right retroareolar region. A single skin vertical pattern was planned with removal of the NAC and reconstruction using a cutaneous flap and left-sided symmetry was achieved using the same pattern.

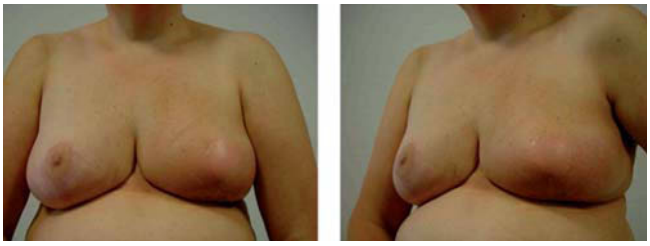

Figure 6 – Double skin vertical mammoplasty and reconstruction of the NAC using an advancement flap. This 48-year-old patient has been diagnosed with a 2.1 cm left-sided retroareolar invasive ductal carcinoma. A double skin vertical mammoplasty with inferior pedicle was proposed and a cutaneous flap from this pedicle was used to reconstruct the areola.

Figure 7 – Reconstruction of the areola with an advancement flap. This 45-year-old patient presents with invasive ductal carcinoma in the right retroareolar region. Due to the large size of her areolas, a vertical mammoplasty in the right breast was suggested using a Grisotti technique with the goal of placing pigmented patch in the new NAC. A circular mammoplasty has been performed on the left breast in order to reduce the breast volume and the areolar diameter.

Construction of the Inferior Pedicle

Once the decision about the NAC has been made, we should approach the construction of the inferior pedicle according to this anatomical element's restoration needs. The techniques for remodelling central tumours are based on the preservation of a pedicle in the inferior pole of the mammary, which has two functions: to provide volume for refilling the central defect and to serve as a platform for reconstruction of the NAC. Based on this premise, all procedures should include a pedicle (flap) whose dissection is maintained against the thoracic wall with the goal of preserving irrigation from the perforating branches of the intercostal arteries. This pedicle will be superior or inferior depending on the tumour location and the oncological resection needs. At the same time, we should select the area that will serve as a cutaneous covering of the central defect or as a base for reimplantation of a free graft. The basic technique for this procedure is the technique described in Milan, known as the Grisotti technique,[21] in which the NAC and all of the tissue down to the pectoral fascia is removed and is then reconstructed by moving one cutaneous island from the four inferior mammary quadrants. This technique provides an adequate aesthetic result and, in the majority of cases, does not require contralateral surgery for symmetry. In these cases, whenever the characteristics of the breast allow, the inferior pedicle is left de-epithelialized for the primary wound closure or a new cutaneous NAC is constructed using a segment from that pedicle without de-epithelialization. When the NAC is not affected from an oncological viewpoint, it can be reimplanted as a free graft in this de-epithelialized area. When a double skin is chosen, construction of the pedicle is similar by preserving an island in the inferior mammary pole.

Surgery on the Healthy Breast to Achieve Symmetry

Operating on the healthy breast is necessary in the majority of patients since vertical mammoplasty changes the volume of the breast and the level of the NAC in the affected breast. Nevertheless, there is a group of patients in whom the objective of symmetry can be declined by accepting a slight asymmetry, especially when it is secondary to irradiation of the affected breast, as well as in the case of patients who undergo single skin vertical mammoplasty with a minimal amount of tissue removed. Women who undergo a double

Figure 8 – Vertical mammoplasty and NAC reimplantation. This 42-year-old patient has been diagnosed with an area of microcalcifications with a maximum diameter of 6 cm in the area between the inferior quadrants of the left breast. The mammotome biopsy revealed microinvasive ductal carcinoma in situ and the radiological study revealed that the microcalcifications extended to the left retroareolar tissue. A bilateral vertical mammoplasty was proposed with removal of the left NAC and reimplantation over the cutaneous area of the same breast.

skin vertical mammoplasty will have to undergo surgery in order to achieve symmetry because of the significant changes in volume and the level of the NAC.

In conclusion, there is a wide variety of oncoplastic procedures that may be applicable to central tumours of the breast and they allow for sufficient resection of the tumour and an aesthetic result that is free of deformities and asymmetry. Application of these procedures increases the rate of preservation in these women and maintains their body image.

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