CIRUGÍA ESPAÑOLA

www.elsevier.es/cirugia

Special article

"Scarless" surgery in the treatment of breast cancer

Benigno Acea Nebril

Servicio de Cirugía General A, Complejo Hospitalario Universitario A Coruña, A Coruña, Spain

ARTICLE INFORMATION

Article history:
Received August 11, 2009
Accepted September 16, 2009
Online November 6, 2009

Keywords:
Breast cancer
Scarless surgery
Oncoplastic surgery
Skin-sparing mastectomy
with conservation of the nipple
Immediate reconstruction

A B S T R A C T

So-called "scarless" surgery in the treatment of breast cancer consists of a group of procedures with a double aim: local control of the oncological process and maintaining the body image of the woman by making incisions that will not be visible. This article describes four approach routes for scarless surgery (periareolar, axillary, submammary, lateral chest) in different contexts of the oncological breast disease. The application of these incisions in the conservative treatment of breast cancer requires making a wide subcutaneous dissection over the tumour location, and a local reconstruction with adjacent breast tissue, so as not to deform the breast contour, as well as moving the nipple with its areola, thus avoiding the surgical modification of the other breast to maintain symmetry between both. We describe the use of hidden incisions to perform mastectomies that try to conserve as much skin as possible, together with the nipple, as well the dissection, with the aid of an endoscope of the latissimus dorsi muscle, in the immediate breast reconstruction.

Cirugía sin cicatrices visibles en el tratamiento del cáncer de mama

Palabras clave:
Cáncer de mama
Cirugía sin cicatrices visibles
Cirugía oncoplástica
Mastectomía con preservación
de la piel y el pezón
Reconstrucción inmediata

R E S U M E N

La denominada *cirugía sin cicatrices visibles* en el tratamiento del cáncer de mama incluye a un grupo de procedimientos quirúrgicos cuyo objetivo es doble: el control local del proceso oncológico y el mantenimiento de la imagen corporal de la mujer mediante la realización de incisiones que no sean visibles. Este artículo describe 4 vías de acceso para la cirugía sin cicatrices (periareolar, axilar, submamaria y torácica lateral) en diferentes contextos de la enfermedad oncológica mamaria. La aplicación de estas incisiones en el tratamiento conservador del cáncer de mama exige la realización de una disección subcutánea amplia sobre la localización tumoral y una remodelación local, con tejido mamario adyacente para no deformar el contorno mamario, así como el desplazamiento del pezón con su aréola, con lo que se evita modificar quirúrgicamente la mama contralateral para mantener la simetría entre ambas. En el ámbito de la mastectomía, se describe la utilización de incisiones que

E-mail address: baceneb@sergas.es

0009-739X/$ - see front matter

quedan ocultas para la realización de mastectomías que tratan de preservar la mayor cuantía de piel posible, junto con el pezón, así como para la disección, con ayuda endoscópica, del músculo dorsal ancho en la reconstrucción mamaria inmediata.

So called "Scarless" Surgery (SS) is a new therapeutic option in the treatment of breast cancer, its ultimate aim is to carry out cancer resections through incisions that are not subsequently perceived by the patient or others. This aim is achieved by planning non-perceivable incisions in the breast or its proximity that will allow the tumour to be removed with the same safety in relation to the cancerous process as conventional treatments and, additionally, with a minimum alteration of the original breast contour, volume and shape. This new surgical procedure, that combines, in relation to the cancerous process, the objectives of radical and conservative surgery (margins, total gland removal, etc.), makes it necessary to previously assess lymph node status (sentinel node biopsy and axillary lymphadenectomy) and also to apply remodelling and reconstruction surgical techniques after tumour removal, all of this conditioned by the reduced surgical approach and the surgical objective.[1] Local remodelling with adjacent tissue is a technical necessity in most procedures of this type, the aim is to avoid causing deformity secondary to healing and irradiation of the surgical bed.

The 2 main objectives of SS (controlling the tumour locally and, at the same time, achieving a final result without perceptible scars) must be considered in the context of the cancerous disease, and have the aim of decreasing the psychological impact of breast cancer and minimizing the alteration of the patient's body image, in such a sensitive area, both cosmetically and emotionally. In this context a woman will be able to face the diagnosis of breast cancer and its subsequent treatment in the different environments in which she moves (family, profession, sexual behaviour, etc.) in a better frame of mind and will, inasmuch as possible, be able to escape the sensation of mutilation, low self-esteem, absence of femininity or social stigma. SS has the purpose of, ultimately, making it possible for a woman with breast cancer to feel feminine in this new personal situation caused by a malignant tumour.

Indications

SS includes a group of technical procedures that are used both in conservative breast surgery and in radical breast surgery with immediate reconstruction. In conservative surgery, this approach combines indications for conservative techniques, limited by the anatomical location of the tumour and the volume to be resected. With reference to tumour location, the best indication is in the case of those tumours located near to the reduced approach route, that is to say, periareolar tumours, those located in the upper external quadrant (axillary tail of Spence, near to the anterior axillary line) or those located in the lower pole near to the inframammary sulcus. From the point of view of tumour volume, the best indication for this approach is in tumours of less than 2 cm (T1), especially T1a and T1b, since in these circumstances remodelling can be carried out using mobilization of dermoglandular flaps. This indication is especially of interest in the case of non-palpable tumours diagnosed by screening that are seen as masses or radiopaque tissue. On the other hand, the main limitation of this technique is its use in breasts of little volume, which, in view of the volume removed, are difficult to remodel with adjacent tissue, as also in multifocal processes which do not permit a limited amount of resection.

The use of an access route that will not leave a perceivable scar in women in whom a mastectomy is performed has the same indications as those procedures that preserve as much skin as possible surrounding the nipple. In this sense, the first requirement, from the point of view of the cancer, is the need for an anatomical plane, free of disease, between the gland and the skin, as also the absence of tumour in the covering skin, either because it has affected this directly or because there has been a carcinoma invasion of the dermal lymphatics.[2,3] Using this criterion, scarless surgery is contraindicated in mastectomies of tumours that are close to the skin, without adequate margin, and when the skin is directly affected and or has signs of inflammation and oedema. These adverse situations can improve if neoadjuvant treatment is used that frees the skin from tumour invasion. Central tumours merit special mention, since their proximity to the areola-nipple complex (ANC) may make it necessary to surgically remove this complex, although in most cases the areola not affected by the tumour may be preserved.[4] From the anatomical point of view, the main contraindication is large fallen breasts, since in these circumstances the best option will be the use of skin-sparing mastectomy (SSM) of the iv type, a breast reduction technique that makes it impossible to apply SS.

Planning surgical access without scarring

In breast cancer it is necessary to keep in mind some basic requirements when planning a non-visible incision for surgical access with the purpose of complying with safety guidelines in relation to the cancerous process and at the same time achieving a cosmetically adequate result. Therefore, these incisions must preserve the integrity of the breast envelope to prevent distortions of the breast contour and displacements of the ANC, especially after radiotherapy. If surgical access does not modify the breast contour or mobilize the ANC, breast symmetry will be preserved and,

therefore, the patient will not require surgery on the other breast. However, and as is the case with all conservative surgery, it will be necessary to presume that there will be a certain amount of breast asymmetry in the medium term, secondary to adjuvant therapies that will cause fixation of the operated breast, and, of course, normal progressive ptosis of the contralateral breast.

The second technical requirement to achieve scarless surgical access is so-called rescue surgery, in the case that the initial procedure is not successful and it is necessary to carry out a mastectomy for local control of the cancer. Traditionally surgeons have been advised to make incisions that would be included in the wound caused by a mastectomy so as to ensure the removal of all the surgical tracts of the prior failed surgical process. Currently, this criterion has been modified by the increase in the number of procedures that try to preserve as much skin as possible, of which skin sparing mastectomy (SSM) and nipple-skin sparing mastectomy (NSSM) are the most outstanding examples. In this new context, it is necessary to keep in mind some basic requirements, not only oncological and cosmetic, when planning a non-visible incision for surgical access in breast cancer, but also anatomical so as to ensure an appropriate blood supply for the skin envelope to carry out a skin-preserving technique (SSM or NSSM), since the results of immediate reconstruction will depend on achieving this.[5,6] In this sense, any of the access routes which we describe below ensure the blood supply of the skin envelope of the breast, since they do not interfere with skin blood supply, especially from the internal thoracic artery.

Finally, the basic requirement for any non-visible access route is that it should remain concealed by anatomical contours, at least in the sight of the patient. There are 4 basic procedures that comply with expectations: periareolar access, axillary access, inframammary access and lateral thoracic access (LTA). Figure 1 exposes the work areas for each of these approaches.

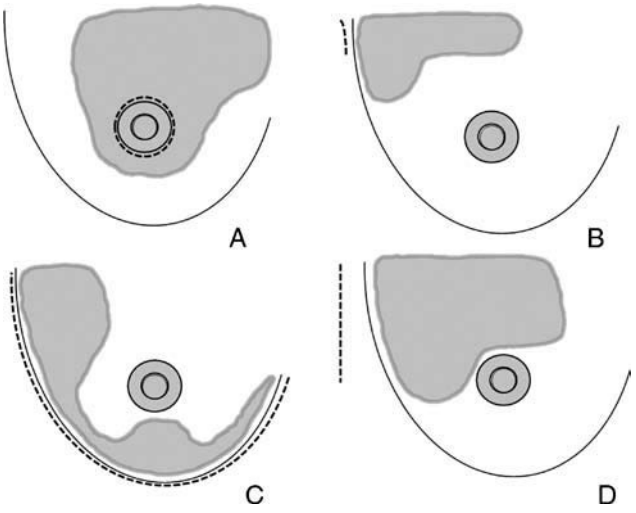

Figure 1 – Areas for hidden access routes to the breast. Conservative surgery. A) The periareolar route of access makes it possible to resect tumours located close to the areola and the upper pole. This approach is especially useful in the case of lesions located in visible areas in the "décolletage" (upper internal quadrant). B) The axillary route of access is indicated for the resection of tumours of the tail of Spence and the upper external quadrant with a simultaneous biopsy of the sentinel node. C) Tumours located near to the inframammary sulcus are candidates for the use of this route of access, especially those located in the lower interquadrant area, where an adipofascia flap may be used. D) Lateral thoracic access is useful for wide resections of the upper external quadrant and subsequent reconstruction with the *Latissimus dorsi* muscle.

Periareolar access or round-block

Periareolar access or round-block is a very well-known procedure performed with the purpose of achieving an adequate cosmetic result, especially in benign breast disease. This access route makes it possible to remove lesions that are close to the areola, up to 2 cm away, although its scope may be increased by using tunnels directed towards the lesion in the breast tissue. The main indication is lesions in the upper pole, since in this area anatomic resection of tissue does not usually affect breast contour, or cause displacements of the nipple and areola. For this reason it is possible to use, in the upper pole of the breast, the tunnel technique to reach lesions that are far from the ANC. This is the best technique to access tumours in an area which is visible in the "décolletage", such as those located in the upper internal quadrant and the upper interquadrant area.[7] On the other hand, the lower pole of the breast is not a good area for this route of access, especially in the case of lesions that are far from the ANC, since the tunnel to access the lesion is difficult to achieve due to breast ptosis and because scarring affects pole convexity and makes it less convex, causing deformation of the breast contour.

This procedure makes it possible, additionally, to carry out extensive skin separation at the upper pole of the breast in those cases in which breast remodelling is necessary dissecting dermoglandular flaps, especially in the case of lesions far from the ANC in the upper internal quadrant or upper inter-quadrant area. The final result ensures a breast volume and ANC location similar to the pre-operative ones, although there is a decrease of breast projection. In those cases in which it is necessary to mobilize the ANC, this can be easily done by means of a second decentralized circle moving the ANC to the new location (Figure 2). Whichever of the 2 options we choose, drainages can be let through the inframammary sulcus to decrease visible scars.

To assess lymph node status a second incision is made at the level of the axilla, either to biopsy the sentinel node or to carry out an axillary lymphadenectomy. In those cases in which a biopsy of the sentinel node is performed on the internal thoracic artery, a resection using the periareolar access by wide detachment of the skin in the upper internal

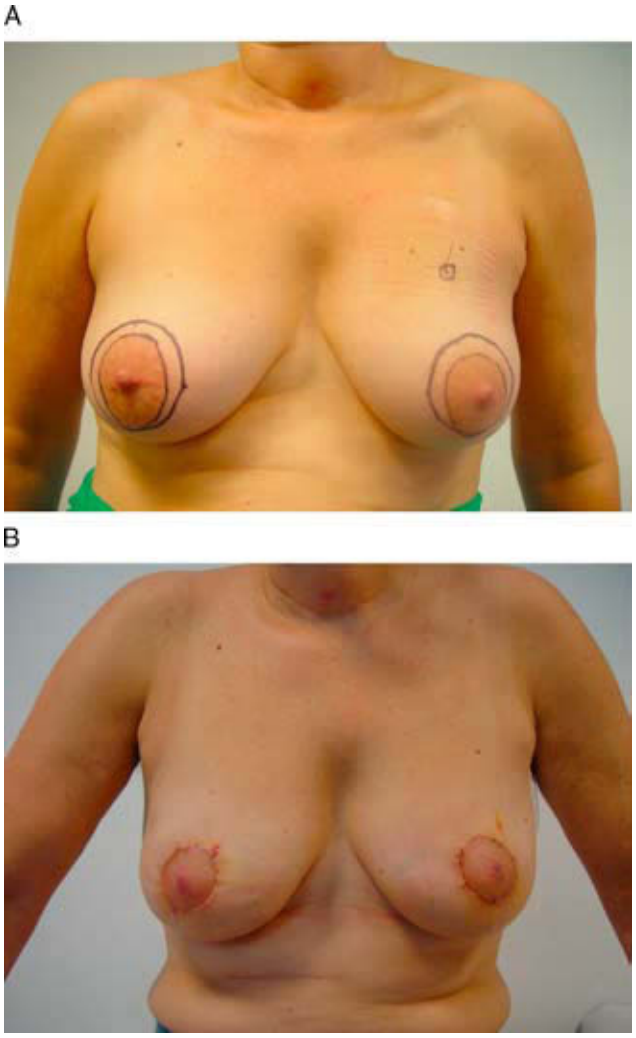

Figure 2 – Periareolar access or round-block. This 48-year-old woman had an infiltrating carcinoma at the juncture of the upper quadrants of the left breast that has been treated with neoadjuvant chemotherapy. A) After radiosurgical location a periareolar access was planned to avoid causing a visible scar in the "décolletage". B) The external circle has been de-centred with the purpose of elevating the ANC, making it necessary to carry out a surgical procedure on the contralateral breast to place both nipples and areolas at the same level.

quadrant and careful dissection of the perforating branches of the internal thoracic artery must be the procedure used. The alternative to this access route is a parasternal incision, which is visible in the décolletage.

The main adverse consequences of a periareolar access are cheloid scars, especially in vulnerable races, such as black people, and hypopigmentation of the areola, which can be corrected by tattooing. Alterations in sensitivity of the ANC must be previously discussed with the patient. To reduce lack of sensitivity to a minimum an attempt must be made, whenever possible, to preserve the internal pedicle. Postoperative radiotherapy may induce, in the medium or long term, cosmetic alterations of the ANC, such as areola distortions, which may be very noticeable when the tumour bed has not been remodelled; or displacements of this complex, which can be minimized by planning a second circle when it is seen that a significant amount of tissue must be resected near the centre of the breast.

Inframammary access

The inframammary sulcus is an ideal access route for scarless procedures, since in most women breast ptosis will hide this sulcus. According to the surgical technique used, we can distinguish 3 procedures with an approach through the inframammary sulcus.

- *Tumourectomy and local remodelling with breast tissue*. The main indication for this procedure is access to tumours near the inframammary sulcus of a size (< 5 cm) that allows local remodelling using dermoglandular flaps. The main limitation of this route of access is the negative impact that local remodelling may have on the contour of the lower pole, which suffers greater alteration the greater the size of the defect and the mobilization of local tissue. For this reason, tumours of the lower internal quadrant are not a good indication for this route of access because they are in a quadrant with little material available for local remodelling. On the other hand, the external interquadrant area is a good location for this access through the lateral fold of the inframammary sulcus, since there is abundant breast tissue available for remodelling (Figure 3). In any case, an important technical detail to keep in mind is that dissection from the inframammary sulcus must always be made in the direction of the breast, and the sulcus must not be detached from its chest implantation, otherwise the anatomy is disfigured.
- *Tumourectomy and local remodelling with extramammary tissue*. Recently some Japanese authors[8,9] have published their experience with the use of inframmary adipofascia flaps for remodelling after tumourectomies in the lower breast pole. This procedure is indicated in tumours of the lower pole in small breasts, in which local remodelling with adjacent tissue is not possible. Access in both procedures (tumourectomy and flap dissection) is through the inframammary sulcus. Dissecting an adipofascia flap requires detachment of subcutaneous tissue from an inframammary region with a greater volume of tissue (> 30%) than the volume of the defect with the object of compensating the atrophy that the flap will suffer over time (Figure 4). Finally, the fat and fascia are detached from their attachment to the chest wall and are subsequently mobilized cephalically and the flap attachment to the inframammary sulcus is maintained. After mobilizing the flap towards the breast defect, the lower edge is sutured to the surgical wound so as to replicate the original inframammary sulcus.
- *NSSM*. This procedure can be carried out through the inframammary sulcus with significant advantages. The resulting scar is not visible, the skin blood supply from the

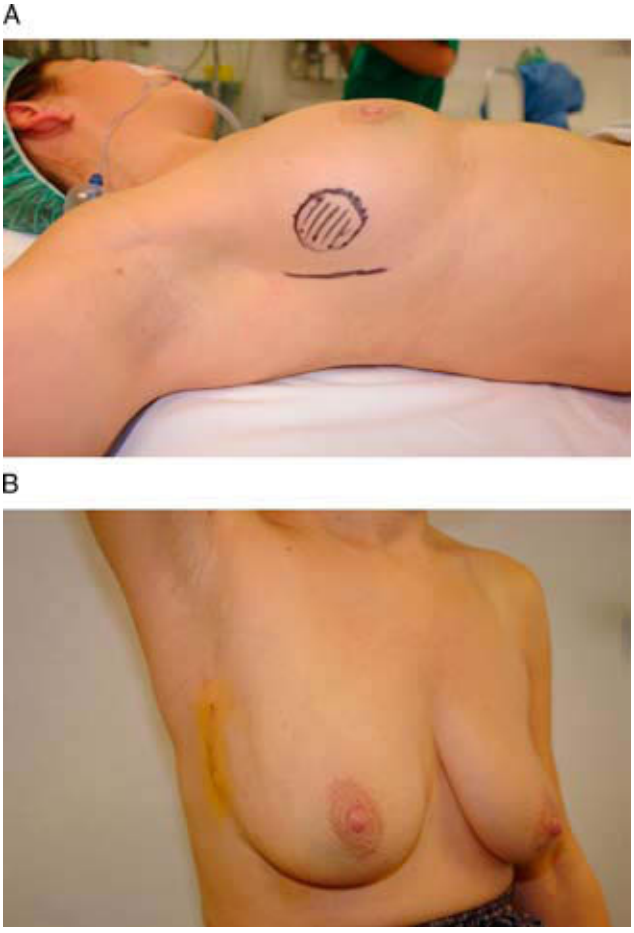

Figure 3 – Inframammary route of access. This 46-year-old woman presented with infiltrating carcinoma at the junction of the external quadrants of the right breast. A) After receiving neoadjuvant chemotherapy access was planned through the lateral portion of the inframammary sulcus. B) The final result is a front view imperceptible lateral scar and an incision that is hidden by the inframammary sulcus.

lateral (axilla), medial (internal thoracic) and upper arteries is not interrupted and it makes it possible to reinforce the new inframammary sulcus and improve the final cosmetic result.[10] Preservation of the nipple gives the breast a natural appearance and is better than the free ANC graft, further, it gives the breast a better identity, a woman identifies it as her own, both in relation to body image and sensitivity (recovery of sensitivity).

The indication for this route of access will depend on the anatomical characteristics of the breast and the cancerous process. From the anatomical point of view, this route of access is indicated in small to medium size breasts (A-B cup), in which the distance between the inframammary sulcus and the limit of the upper pole is not greater than 18-20 cm.[11,12] This limitation is related to the difficulties in dissecting the upper pole, the furthest from the place

Figure 4 – Making an adipofascia flap. A) Making an adipofascia flap begins by planning the area of inframammary detachment at the level of the breast lesion. B) Subsequently the adipofascia flap is prepared and detached from skin covering and the thoracic wall preserving its attachment in the inframammary sulcus from which it receives its blood supply. C) Finally, the flap is moved to its new location in the lower breast pole to fill the defect left by dissection of the cancer.

of entry, and with the fact that this distance must not be greater than the separators. From the point of view of the cancer, central breast tumours, tumours larger than 3 cm and those with lymphatic or vascular invasion must be ruled out. In these cases neoadjuvant treatment with chemotherapy may be advisable to reduce tumour mass. Women who smoke and are obese must be informed of the increase of local complications including skin necrosis and infection. However these are not contraindications for this procedure.

The performance of an NSSM through the inframammary sulcus must ensure 2 things: a viable ANC blood supply and freedom from cancer and a viable blood supply of the skin envelope. To ensure a viable blood supply for the ANC it is necessary to carefully dissect the retroareolar tissue to leave a minimum amount. Once the surgical specimen is removed, this area can be everted through the surgical wound with the object of clearing the greatest possible amount of tissue.[13] At this point a viable blood supply for the ANC depends on the microvascularization from the dermal vessels of the areola distributed in concentric rings surrounding the nipple. With reference to safety related to the cancerous process, the use of an NSSM technique requires preoperative magnetic resonance to identify the relation of the tumour with the ANC and rule out its involvement. During surgery it is advisable to also perform an intraoperative biopsy of retroareolar tissue to rule out neoplasic involvement of the nipple, which if present, will require its resection and a conversion to SSM and areola. Finally, the survival of a viable blood supply to the skin envelope will depend on the patency of the perforating

branches of the internal thoracic and *Latissimus dorsi*, which requires that these are preserved during dissection of the surgical specimen.

Safety in relation to cancer for this procedure has currently increased due to several factors. First, surgeons have undergone greater specialization in breast cancer surgical techniques that allow them to carry out a more precise dissection of skin flaps (< 2 mm) and optimize their resection of cancers with more complex locations, such as the external upper quadrant and the axilla or those far from the place of entry, where classically there have been recurrences. A second factor has been early diagnosis of the disease which has made it possible to access tumours that are ever smaller and smaller and that can be easily controlled by mastectomy. To this we must add the use of neoadjuvant treatments, which, similarly to chemotherapy, cause a significant decrease in tumour size, or intraoperative radiotherapy of the ANC that significantly improves the risk of relapses at this location.[14-15] Finally the introduction of magnetic resonance during the preoperative study makes it possible to identify tumours that affect the ANC to rule out nipple preservation and choose an I type SSM technique in these cases.[16] In this sense, ductal carcinoma in situ is one of the most problematic clinical types of breast cancer for NSSM, since its multicentricity and the fact that it cannot be treated with neoadjuvant therapy condition the involvement of a not unappreciable involvement of retroareolar tissue.

Axillary route of access

Axillary access is the least intensive procedure in breast cancer conservative treatment, since it makes it possible to carry out tumour resection and assessment of the lymph node status through a minimum incision in the anterior axillary line[17] (Figure 5). Its main indication is in cases of tumours located in the tail of Spence and in the external upper quadrant, although some authors have used it to remove lesions in medial or lower quadrants with the help of endoscopic instruments or a second periareolar incision.[18-20] Its main technical limitation is the distance to the axillary incision, since to carry it out not only is it necessary to create a tunnel to the tumour, but also to carry out local

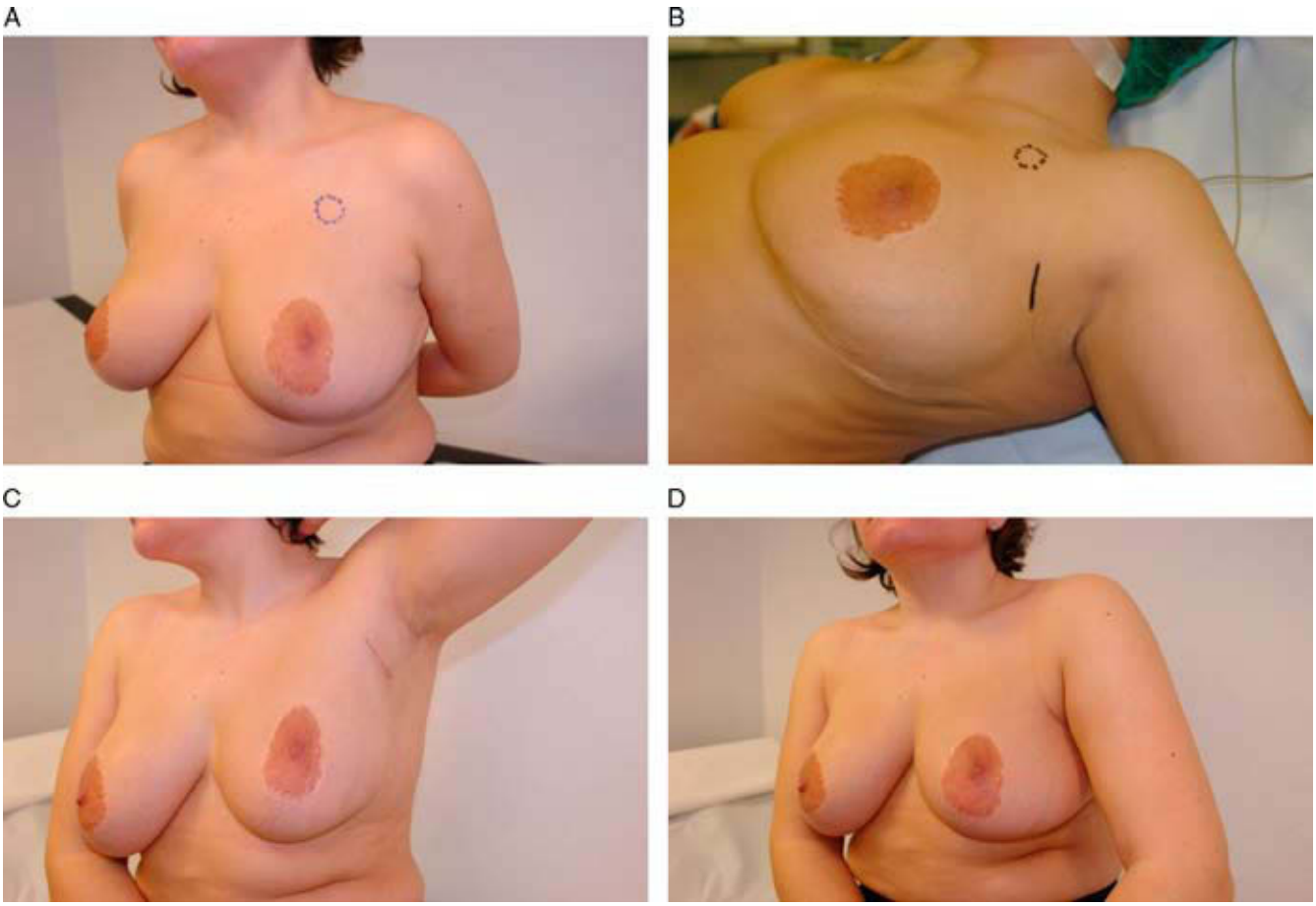

Figure 5 – Axillary route of access. A) This 42 year old woman was diagnosed with infiltrating carcinoma in the left infraclavicular region. B) To achieve tumour resection an axillary approach was planned through an incision on the skin fold of the anterior axillary line. C and D) The final result is a minimal incision in the axilla which is only visible when the arm is abducted.

tissue detachment to facilitate both tumour resection and remodelling. Skin involvement and mulifocality are other limitations to this route of access.

Technically this access procedure is simple. After an incision on the posterior edge of the greater pectoral muscle, the incision progresses subcutaneously towards the tumour, guided by palpation or by a method that will make it possible to locate palpable lesions (swab, harpoon, etc.). Once at the tumour, a wide detachment of the area is performed to make resection and margin marking possible. Finally, the dermoglandular flaps necessary to close the defect are designed and dissected out of adjacent tissue. For this procedure the patient must be in a sitting position so as to detect possible retractions of the breast contour.

Evaluation of lymph node status can be done through the same incision, especially when a biopsy of the sentinel node is planned, since it will be easy to perform through the wide axillary incision which is near the area of isotope uptake. If an axillary lymphadenectomy should be necessary, this can be performed widening the initial incision in a "U" shape and making the posterior branch coincide with the lateral edge of the *Latissimus dorsi* so as to hide it in the axillary gap after opening aspiration drainages.

Lateral thoracic access

This is a procedure which must be considered in the context of partial or total breast reconstruction, since we have available not only a place of entry for local or total breast resection, but, furthermore, an access to the *Latissimus dorsi* muscle for its subsequent dissection and anterior mobilization. This route of access may be used as a single place of entry or in combination with other incisions (periareolar and inframammary) to appropriately complete breast removal. It use as the only place of entry is based on partial breast resections in the external upper quadrant and its reconstruction with the muscular body of the *Latissimus dorsi*.[21,22] These are cases of extensive multifocal tumours in which it is not possible to repair the breast by remodelling adjacent breast tissue (Figure 6). On the contrary, we must associate the incisions with other non-visible incisions in cases in which the proposed technique is mastectomy and immediate reconstruction. In this manner, we can combine a lateral access with an incision in the inframammary sulcus to perform NSSM and immediate reconstruction with an implant covered by the *Latissimus dorsi*. In this case the inferior edge of the flap will be sutured to the inframammary sulcus, to maintain the concept and practice of scarless surgery. A second option is the association of a lateral thoracic access with a periareolar incision to optimize resection in the internal quadrants. In most cases resection of the ANC will be necessary, either for subsequent reimplantation or to close the central defect with a tobacco pouch suture.

The LTA presents difficulties for the assessment of the status of the axillary lymph nodes, especially if a lymphadenectomy is to be performed, since its location at the level of the inframammary sulcus makes it impossible

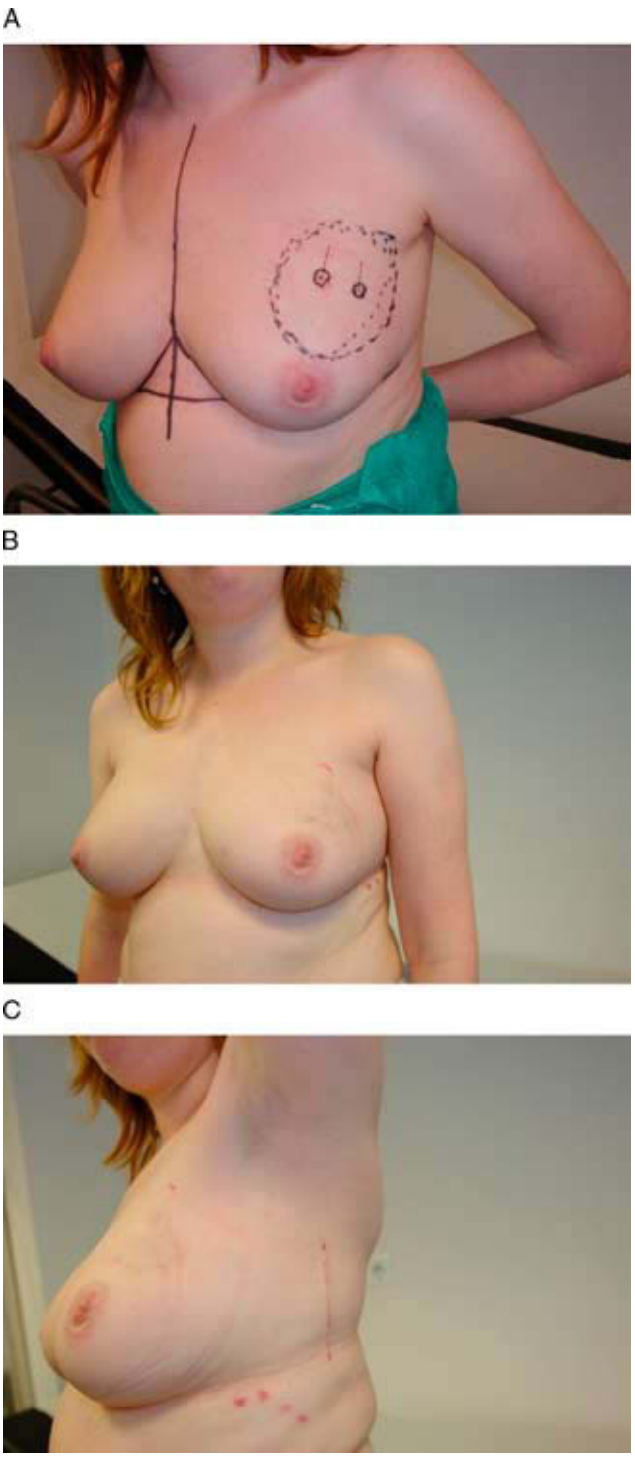

Figure 6 – Lateral thoracic access. This 35 year old woman was diagnosed with multifocal infiltrating carcinoma in the upper external quadrant of the left breast. A) After neoadjuvant treatment, resection of the area affected by the tumour was planned, this was previously marked with harpoons, and resected through a lateral incision that, additionally, made it possible to dissect the *Latissimus dorsi* to partially reconstruct the defect. B and C) The final result is a breast that is not deformed, and a lateral incision hidden from a frontal view

to get a good view of the axillary vein. However, the sentinel node can be biopsied by creating a tunnel, under the guidance of the isotope marker, towards the lesser pectoral muscle. Technically to perform a LTA a longitudinal 10 cm incision in the posterior axillary line on the anterior edge of the *Latissimus dorsi* must be performed, as has been previously described in our country by Güemes et al.[23] Subsequently, with the help of endoscopic instruments, a dissection of the body of the *Latissimus dorsi* may be performed, to free it, initially, from the subcutaneous tissue, and to subsequently detach it from the chest wall. Finally, the muscle body is sectioned as distally as possible to release the muscle so it can be rotated to its new location in the breast.

Conclusions

In conclusion scarless surgery is a new challenge in the surgical treatment of breast cancer, its aim is to ensure control of the cancer and to improve the body image of the patient. These procedures are compatible with and complementary to the great majority of conservative techniques, breast remodelling and reconstruction; therefore, it is important that they become known and spread in surgical circles, since most surgeons are sufficiently skilled to use them. Only the universal use of these procedures can ensure the best for our patients.

REFERENCES

1. Shrotia S. Techniques for improving the cosmetic outcome of the breast conservation surgery. Eur J Surg Oncol. 2001;27:109-112.
2. Sacchini V, Pinotti J, Barros A, Luini A, Pluchinotta A, Pinotti M, et al. Nipple-sparing mastectomy for breast cancer and risk reduction: Oncologic or technical problem? J Am Coll Surg. 2006;203:704-14.
3. Ramos Boyero M. Lamastectomía ahorradora de piel como alternativa a la mastectomía estándar en el cáncer de mama. Cir Esp. 2008;84:181-7.
4. Acea Nebril B. Técnicas oncoplásticas para el manejo de tumores centrales de mama. Cir Esp. 2009;85:14-9.
5. Gabka C, Gernot M, Heinrich B. Immediate breastre construction for breast carcinoma using the periareolar approach. Plast Reconstr Surg.1998;101:1228-34.
6. Love S, Barsky S. Anatomy of the nipple and breast ducts revisited. Cancer. 2004;101:1947-57.
7. Shrotria S. The peri-areolar incision-gateway to the breast! Eur J Surg Oncol. 2001;27:601-3.
8. Kijima Y, Yoshinaka H, Owaki T, Funasko Y, Aikou T. Immediate reconstruction using inframammary adipofascial flap of the anterior rectus sheath after partial mastectomy. Am J Surg. 2007;193:789-91.
9. Ogawa T, Hanamura N, Yamashita M, Ri Y, Kuriyama M, Isaji S. Usefulness of breast-volume replacement using an infra-mammary adipofascial flap after breast-conservation therapy. Am J Surg. 2007;193:514-8.
10. Viluk J, Santillan A, Kaur P, Laronga C, Meade T, Ramos D, et al. Feasibility of sentinel lymph node biopsy through an inframammary incision for a nipple-sparing mastectomy. Ann Surg Oncol. 2008;15:3402-4306.
11. Stolier A, Sullivan S, Dellacroce F. Technical considerations in nipple-sparing mastectomy: 82 consecutive cases without necrosis. Ann Surg Oncol. 2008;15:1341-7.
12. Wijayanayagam A, Kumar A, Foster R, Esserman L. Optimizing the total skin-sparing mastectomy. Arch Surg. 2008;143:38-45.
13. Rusby J, Brachtel E, Taghian A, Michaelson J, Koerner F, Smith B. Microscopic anatomy within the nipple: Implications for nipple-sparing mastectomy. Am J Surg. 2007;194:433-7.
14. Petit J, Veronesi U, Rey P, Rotmensz N, Botteri E, Rietjens M, et al. Nipple-sparing mastectomy: Risk of nipple-areolar recurrences in a series of 579 cases.Breast Cancer Res Treat. 2009;114:97-101.
15. Crowe J, Patrick R, Yetman R, Djohan R. Nipple-sparing mastectomy update. Arch Surg. 2008;143:1106-10.
16. Margulies A, Hochberg J, Kepple J, Henry-Tillman R, Westbrook K, Klimberg S. Total skin-sparing mastectomy without preservation of the nipple-areola complex. Am J Surg. 2005;190:920-6.
17. Spillane A, Brennan M. Minimal access breast surgery. A single breasti ncision for breast conservation surgery and sentinel lymph node biopsy. Eur J Surg Oncol. 2009;35: 380-386.
18. Yamashita K, Shimizu K. Trans-axillary retro-mammary gland route approach of video-assisted breast surgery can perform breast conserving surgery for cancer even in inner side of the breast. Chin Med J.2008;12:1960-4.
19. Lee E, Kook S, Park Y, Bae W. Endoscopy-assisted breast-conserving surgery for early breast cancer. World J Surg. 2006;30:957-64.
20. Yamashita K, Shimizu K. Transaxillary retromammary route approach of video-assisted breast surgery enables the inner-side breast cancer to be resected for breast conservating surgery. Am J Surg. 008;196:578-81.
21. Nakajima H, Fujiwara I, Mizuta N, Sakaguchi K, Hachimine Y. Video-assisted skin-sparing breast-conservation surgery for breast cancer and immediate reconstruction with autologous tissue. Ann Surg. 2009;249:91-6.
22. Shrotria S. Single axillary incision for cuadrantectomy, axillary clearance and immediate reconstruction with latissimus dorsi. Br J Plast Surg. 2001;54:128-31.
23. Güemes A, Sousa R, Cachón R, Valcarreres P, Rufas M, Gonzalo A, et al. Cirugía mamaria mínimamente invasiva: reconstrucción mamaria mediante colgajo muscular puro del gran dorsal. Cir Esp. 2008;83:85-8.