

BREAST RECONSTRUCTION WITH MICROSURGICAL FREE COMPOSITE TISSUE TRANSPLANTATION

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In the reconstruction of breast and adjacent soft tissue defects, whether congenital or acquired, three components must be considered: the quality and quantity of the overlying skin, the volume of the breast itself and the pectoral muscles, and lastly the nipple-areola complex. Microvascular surgical techniques permit the transfer of large composite flaps in one stage. In this paper we describe our experience in applying this composite flap technique to the problem of breast reconstruction.

CASE REPORTS

Case 1. A 30-year-old woman presented with a huge cavernous haemangioma involving the left breast and the adjacent soft tissues (Fig. 1). Angiography showed the lesion to extend down to the chest wall. It was agreed that the surgical excision should include most of the left breast along with the overlying skin and it was decided to use a free groin flap to provide the new skin cover over the chest.

At operation all the affected skin and most of the breast tissue were excised. The internal mammary artery and vein were exposed as recipient vessels for the free groin flap. One artery and two veins were anastomosed microsurgically. Using part of the haemangioma as subcutaneous pedicle, the nipple-areola complex was preserved and exteriorised by making a small hole in the revascularised groin flap. The flap took completely without complication and 9 months later the residual part of the haemangioma that had been used as a subcutaneous pedicle to support the nipple-areola complex was excised and a 200 cc silicone breast prosthesis was inserted (Fig. 2).

Case 2. A 20-year-old woman presented with a congenital absence of the right breast, absence of the pectoral part of the pectoralis major muscle, and a deformity of the chest wall (Fig. 3). It seemed that the overlying skin was insufficient to accept a silicone breast prosthesis and originally we planned to introduce a skin flap to fill the defect created by the incisional line shown in Figure 3c and to augment the depression over the anterior chest wall with pedicled omentum. In this way the stump of the gastro-epiploic vessels could provide recipient vessels for the free flap. However when the skin was elevated from the chest wall through this incision a subcutaneous pocket was created that was large enough to accept a prosthesis. So the original plan was altered and the omentum was used to augment the medial portion of the upper chest and a de-epithelialised groin flap was placed in the subclavicular region. A silicone breast prosthesis was used to reconstruct the breast volume (Fig. 4). Later a nipple-areola complex was reconstructed with a full thickness skin graft from the groin (Fig. 5).

Case 3. A 29-year-old woman had undergone a right-sided standard radical mastectomy for stage-I breast cancer. Before surgery she was very concerned about the possibility of breast reconstruction and we decided to perform primary reconstruction after confirming by frozen section the absence of axillary node involvement. The breast surgeons preserved the lateral thoracic and thoracodorsal vessels during mastectomy as recipient vessels for a free flap transfer. The groin flap was raised on the ipsilateral side and the nutrient vessels were

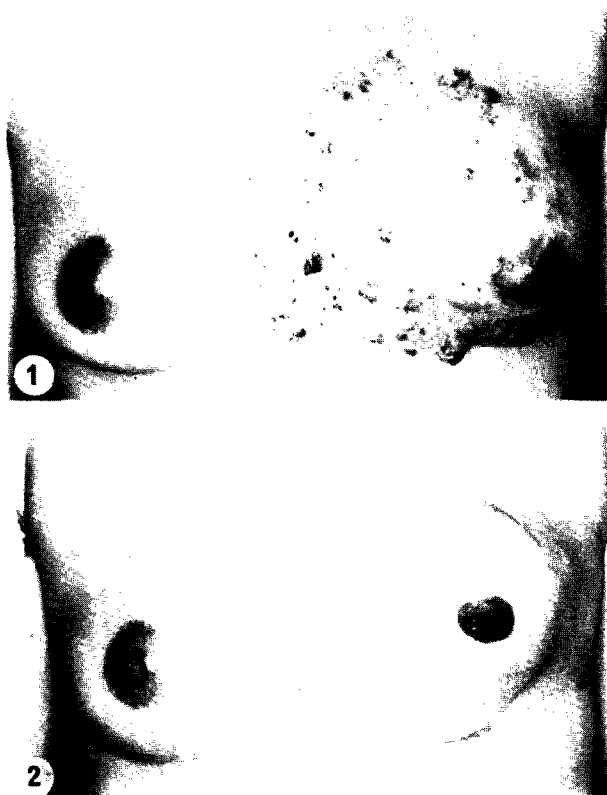


FIG. 1. (Case 1) Preoperative view of the huge cavernous haemangioma over the left breast and chest wall.

FIG. 2. (Case 1) A free groin flap was transferred to supply the resultant skin defect using the internal mammary vessels as recipient vessels. A nipple-areola complex was preserved using part of the haemangioma as a subcutaneous pedicle and exteriorised through a hole made in the revascularised groin flap. A 200 cc silicone prosthesis was placed under the free flap at a later operation.

anastomosed microsurgically to the vessels preserved in the mastectomy wound. (In retrospect, we consider that the groin flap should have been raised on the contralateral side because primary closure of the groin flap donor site increased skin tension over the lower chest).

Though the flap survived completely, it was found that its position was too high to accept an adequately sized silicone prosthesis (Fig. 6). A second flap was delayed on the lateral abdominal wall. The transposition of this flap and the insertion of the silicone prosthesis were performed simultaneously. Later free dermal-fat grafts from both buttocks were inserted to augment the pectoral muscle defect and the nipple-areola complex was reconstructed with skin from the groin and vulva (Fig. 7).

Case 4. A 32-year-old woman presented with a cancer in the right breast proved by excisional biopsy. At first she refused amputation of the breast but we persuaded the patient to accept a radical mastectomy by promising that we could reconstruct the breast. A contralateral groin flap was used to fill the skin defect (Fig. 8) and the flap survived completely. Four months later a 200 cc silicone breast prosthesis was inserted under the groin flap and a 100 cc prosthesis was inserted on the normal side. One-and-a-half months after the insertion of the prosthesis a nipple-areola complex was reconstructed (Fig. 9).

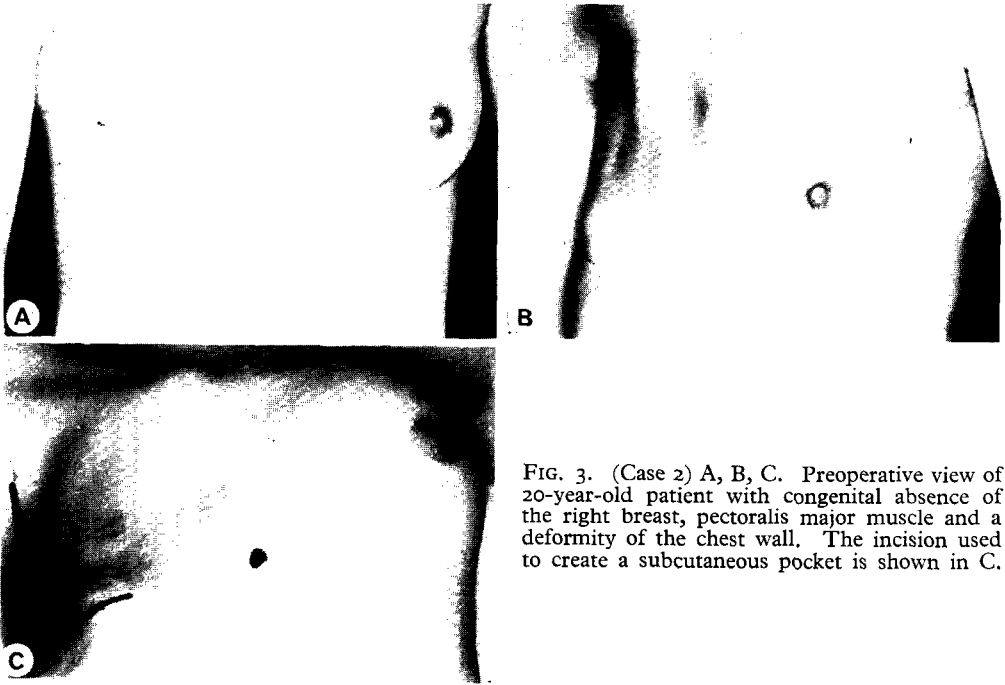


FIG. 3. (Case 2) A, B, C. Preoperative view of 20-year-old patient with congenital absence of the right breast, pectoralis major muscle and a deformity of the chest wall. The incision used to create a subcutaneous pocket is shown in C.

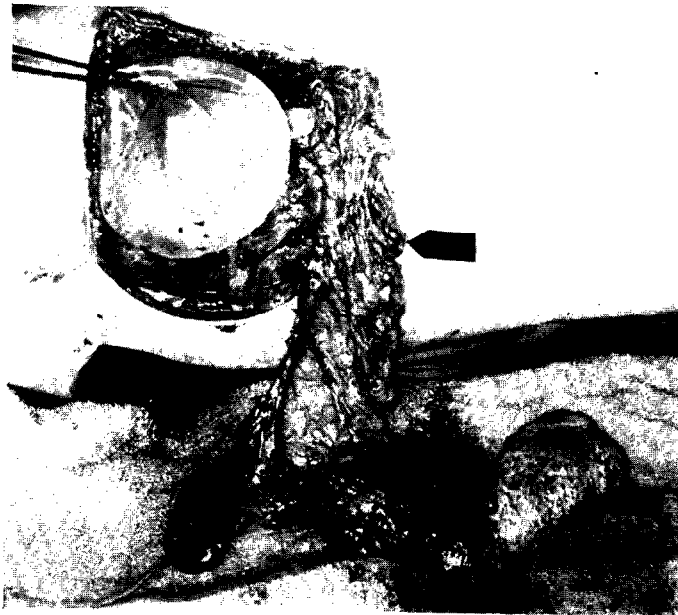


FIG. 4. (Case 2) View at operation. The omental flap (left arrow) pedicled on the right gastro-epiploic vessels was used to augment medial portion of the upper chest and a de-epithelialised groin flap (right arrow) was placed in the subclavicular region. The groin flap was revascularised by anastomosing its feeding vessels to the stump of the gastro-epiploic vessels. A silicone bag prosthesis was used to reconstruct the breast volume.

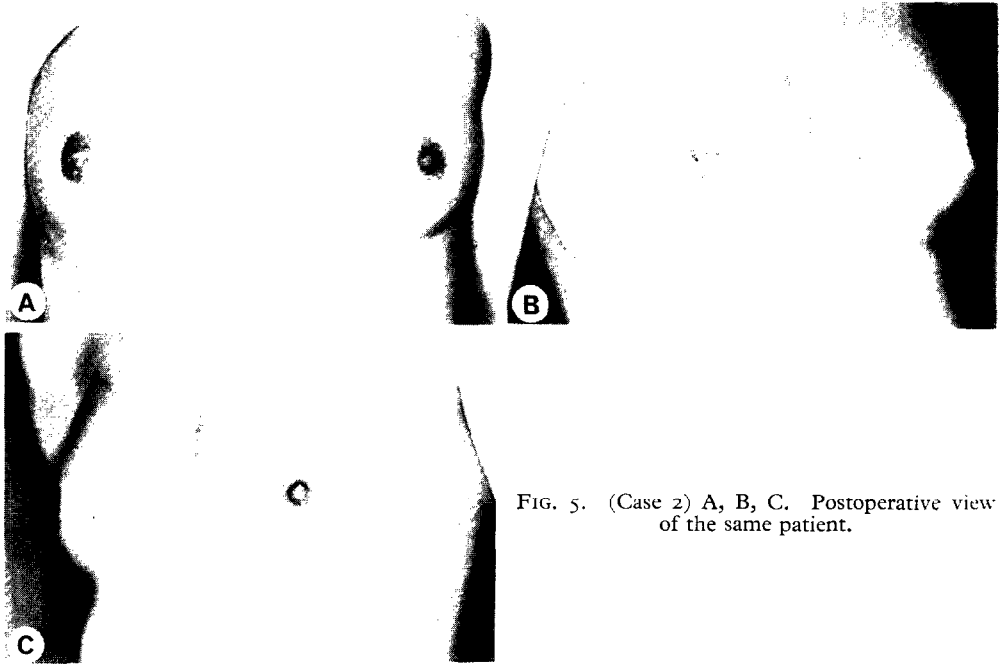


FIG. 5. (Case 2) A, B, C. Postoperative view of the same patient.

Case 5. A 34-year-old woman underwent a standard radical mastectomy and simultaneous free groin flap transfer to the mastectomy wound. The flap survived completely. She was quite satisfied with the result and refused further reconstructive procedures.

DISCUSSION

Early diagnosis and treatment of breast cancer is now more common because of a greater awareness of the disease among women and the development of more accurate diagnostic methods. As a result the number of the women who undergo a modified radical mastectomy using a transverse incision and preserving the pectoral muscle(s) or a simple mastectomy is increasing compared with those who have a standard or classical radical mastectomy. After these less disfiguring operations, the reconstruction of the breast is much easier. Usually insertion of a silicone breast prosthesis on the affected side and reduction or subcutaneous mastectomy of the contralateral side will be all that is required. By contrast, the reconstruction of the breast after a standard or classical radical mastectomy requires the importation of adequate well-vascularised skin flaps. For this purpose various kinds of local and distant flaps have been used. These include arm jump flaps, transverse abdominal flaps, latissimus dorsi myocutaneous flaps and omental flaps (Arnold *et al.*, 1976). Unfortunately many of these procedures are multi-staged, time-consuming and leave unsightly scars on donor sites. A latissimus dorsi myocutaneous flap which has been popularised recently (Schneider *et al.*, 1977; Bostwick *et al.*, 1978) is a 1-stage procedure and can supply adequate skin cover as well as adequate muscle volume to the missing breast area and leave a minimal donor deformity. This flap seems to be the ideal method available at present but this flap cannot be used if the thoracodorsal vessels are sacrificed during the original radical mastectomy and it may not fit well into the vertical incisional defect.



FIG. 6. (Case 3) A free groin flap was transferred to facilitate primary closure of the chest wound after a standard radical mastectomy for cancer. Because the position of the flap was too high to accept an adequately sized prosthesis, a second flap was delayed on the lateral abdominal wall. The transposition of the flap and the insertion of a silicone prosthesis were performed simultaneously.

Serafin *et al.* (1978) stressed the usefulness of a free skin flap transfer in the repertoire of breast reconstructions. They reconstructed missing breasts by supplying a well-vascularised free skin flap with microsurgical anastomosis and inserting a silicone breast prosthesis. Their reconstructions were performed as secondary procedures and the interval between the original radical mastectomy and the reconstruction ranged from 2 to 16 years, with an average interval of 6.3 years.

The history of breast reconstruction is still short and there is no certain answer to the correct timing of reconstruction after mastectomy for cancer. There are sporadic reports of primary breast reconstruction after mastectomy and we also have done a primary reconstruction on our 3 cancer patients. Our patients are still young and before the radical mastectomy was performed they were deeply concerned about the possibility of breast reconstruction. Serafin and Given (1978) established criteria for the timing of breast reconstruction after mastectomy and advocated immediate or early reconstruction when the lesion is less than 2 cm in size and the regional nodes are free of tumour. There is general agreement that the recurrence of breast cancer usually develops within 5 years of diagnosis. Five years is too long a period to wait for young women after mastectomy and they should be considered for immediate or early reconstruction. Moreover there

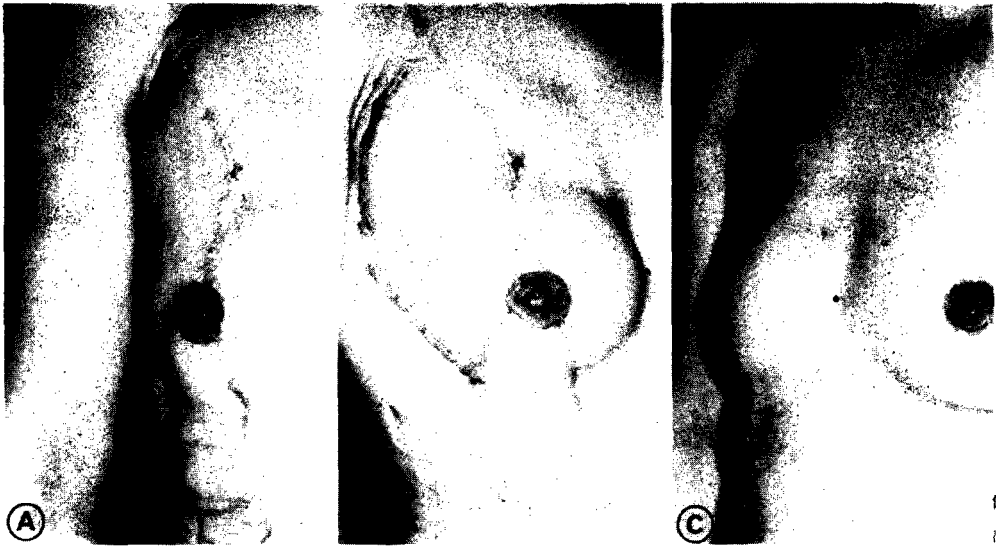


FIG. 7. (Case 3) A, B, C. Postoperative view of the same patient.



FIG. 8. (Case 4) The design of the standard radical mastectomy on the right side and the groin flap on the contralateral side are outlined.

is agreement that such reconstruction does not interfere with their follow-up nor in any way jeopardise their chances of survival (Snyderman, 1976). If the reconstruction of the breast with a free flap is attempted the best chance is at the time of radical mastectomy because appropriate recipient vessels can be prepared with ease. If the reconstruction team begin the elevation of the groin flap before the breast surgeons finish their job the additional operating time required for the reconstruction is only the time taken for the vascular anastomoses which are usually easy with good exposure and long, big vascular pedicles. The use of the groin flap leaves a minimal donor defect because it can be closed primarily and hidden within the bikini line.

In the case of secondary reconstruction the recipient vessels must be searched for

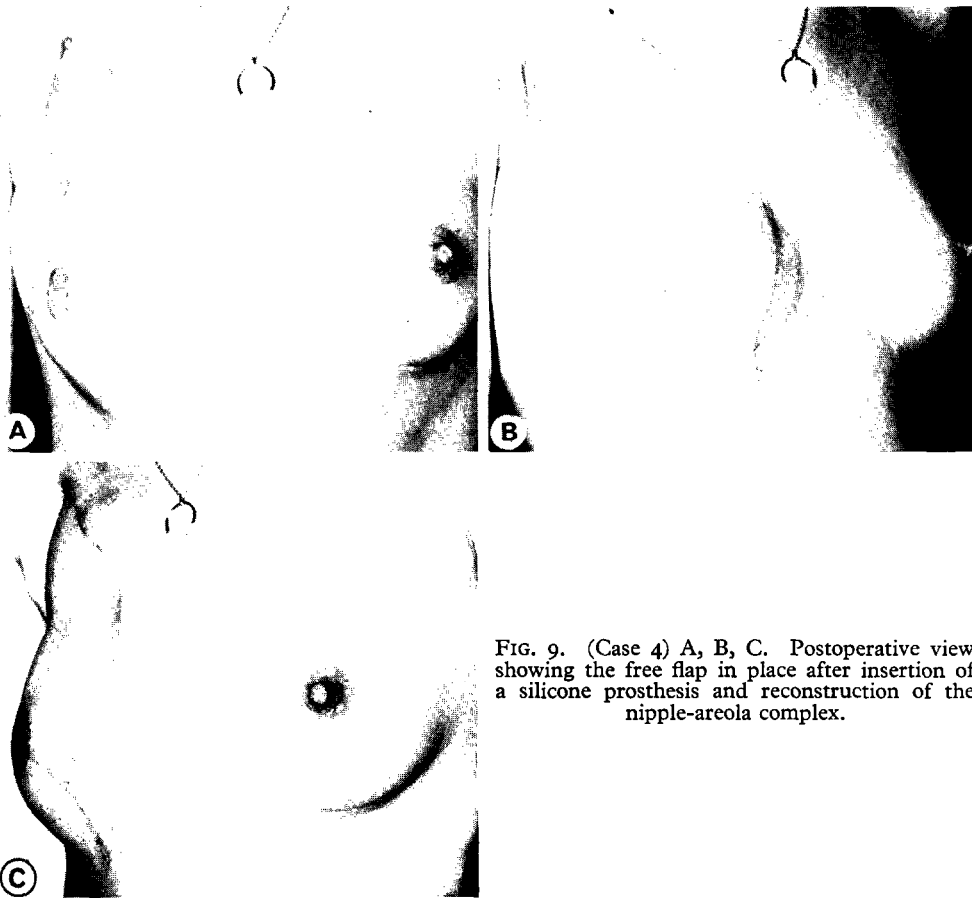


FIG. 9. (Case 4) A, B, C. Postoperative view showing the free flap in place after insertion of a silicone prosthesis and reconstruction of the nipple-areola complex.

in the axilla or parasternal region often in dense scar. We have also found that the use of pedicled omentum (as in case 2) is another good alternative because it can augment the pectoral muscle defect and conceal the all too visible rib cage and simultaneously provide recipient vessels for a free flap.

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REFERENCES

- ARNOLD, P. G., HARTRAMPF, C. R. and JURKIEWICZ, M. J. (1976). One-stage reconstruction of the breast, using the transposed greater omentum. *Plastic and Reconstructive Surgery*, **57**, 520.
- BOSTWICK, J. III, VASCONEZ, L. O. and JURKIEWICZ, M. J. (1978). Breast reconstruction after a radical mastectomy. *Plastic and Reconstructive Surgery*, **61**, 682.
- FUJINO, T., HARASHINA, T. and ENOMOTO, K. (1976). Primary breast reconstruction after a standard radical mastectomy by a free flap transfer. *Plastic and Reconstructive Surgery*, **58**, 371.
- SERAFIN, D., GEORGIADIS, N. G. and GIVEN, K. S. (1978). Transfer of free flaps to provide well-vascularized, thick cover for breast reconstructions after radical mastectomy. *Plastic and Reconstructive Surgery*, **62**, 527.
- SERAFIN, D. and GIVEN, K. S. (1978). Reconstruction of the thorax and breast following radical mastectomy. Chapter 38, pp. 541-572, in "Microsurgical Composite Tissue Transplantation". St. Louis: The C. V. Mosby Company.

- SCHNEIDER, W. J., HILL, H. L. JR. and BROWN, R. G. (1977). Latissimus dorsi myocutaneous flap for breast reconstruction. *British Journal of Plastic Surgery*, **30**, 277.
- SNYDERMAN, R. K. (1976). On breast reconstruction after mastectomy for cancer. *Plastic and Reconstructive Surgery*, **57**, 224.