Immediate Breast Reconstruction with Free TRAM Flap: A Case Report with a 10-Year Follow-Up and Radiological Imaging

BOWORNSILP CHOWCHUEN, M.D., M.B.A.*,
PRATHANA CHOWCHUEN, M.D.**

Abstract

Immediate breast reconstruction using free microsurgical transverse rectus abdominis flap (free TRAM flap) has been emerging as the recommended treatment for breast cancer patients. Progress of a patient receiving this treatment was documented using a ten-year follow-up study. The results were very satisfactory in both cosmetic appearance and therapeutic result. The surgical techniques of breast mound reconstruction and subsequent nipple and alreolar reconstruction with contralateral mastopexy were described. Mammographic findings of the post-reconstruction breast, recommendation for follow-up and the use of mammography were presented. With this successful long-term follow-up, the authors recommend immediate breast reconstruction using free TRAM flap as another option for breast cancer treatment.

Key word : Breast Reconstruction, Free TRAM Flap, Long-Term Follow-up, Mammography

CHOWCHUEN B & CHOWCHUEN P
J Med Assoc Thai 2001; 84: 1037-1045

Immediate breast reconstruction represents a clinical advance in breast cancer management. It lowers psychological morbidity for women by eliminating the need to live with the significant deformity caused by total mastectomy. Georgiade reported the first large-scale study in 1982, concluding that immediate reconstruction offered advantages over delayed reconstruction, with no apparent adverse effect on the natural course of the malignancy(1). The benefits of immediate breast reconstruction are psychosocial, cosmetic, reduced morbidity and reduced cost(2). The transverse rectus abdominis myocutaneous flap (TRAM flap) has become a well-accepted method for breast reconstruction using

* Division of Plastic Surgery, Department of Surgery,
** Department of Radiology, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.

autogeneous tissue and is especially well suited for immediate reconstruction after mastectomy[3]. Microsurgical free tissue transfer was introduced as the most advanced form of immediate breast reconstruction and in 1989, Grotting presented his findings from using the free TRAM flap for immediate breast reconstruction as well as indications and contraindications, pre-operative preparation and the surgical technique[4]. Arnez, et al (1991) reported the experience and described the surgical technique with 50 free flap breast reconstructions[5]. Despite the increasing availability of immediate reconstruction, it is still not universally considered a standard part of breast cancer treatment and is still largely determined by age, location of the practice and the ablative breast surgeon's attitude toward reconstruction [6]. There have been a limited number of long term follow-up reports of breast reconstruction. Banic, et al (1995) performed a multi-centric study of 111 consecutive patients and reported the latest results of breast reconstruction with the free TRAM flap. The longest follow-up period was 24 months[7].

Imaging a breast that has had cancer and been reconstructed has been thought to contain an inherent problem, namely, the reconstructed tissue and implant may be obscuring a possible recurrence. Also, frequent patient follow-ups are emphasized. Mammographic imaging of the autogeneous myocutaneuos flap is controversial but has been recommended by some authors because mammographic detection of non-palpable local recurrences in this flap continues to be reported[8].

The objective of this article was to present the surgical technique and long-term follow-up of a patient who received immediate breast reconstruction with the free TRAM flap. The role of mammo-

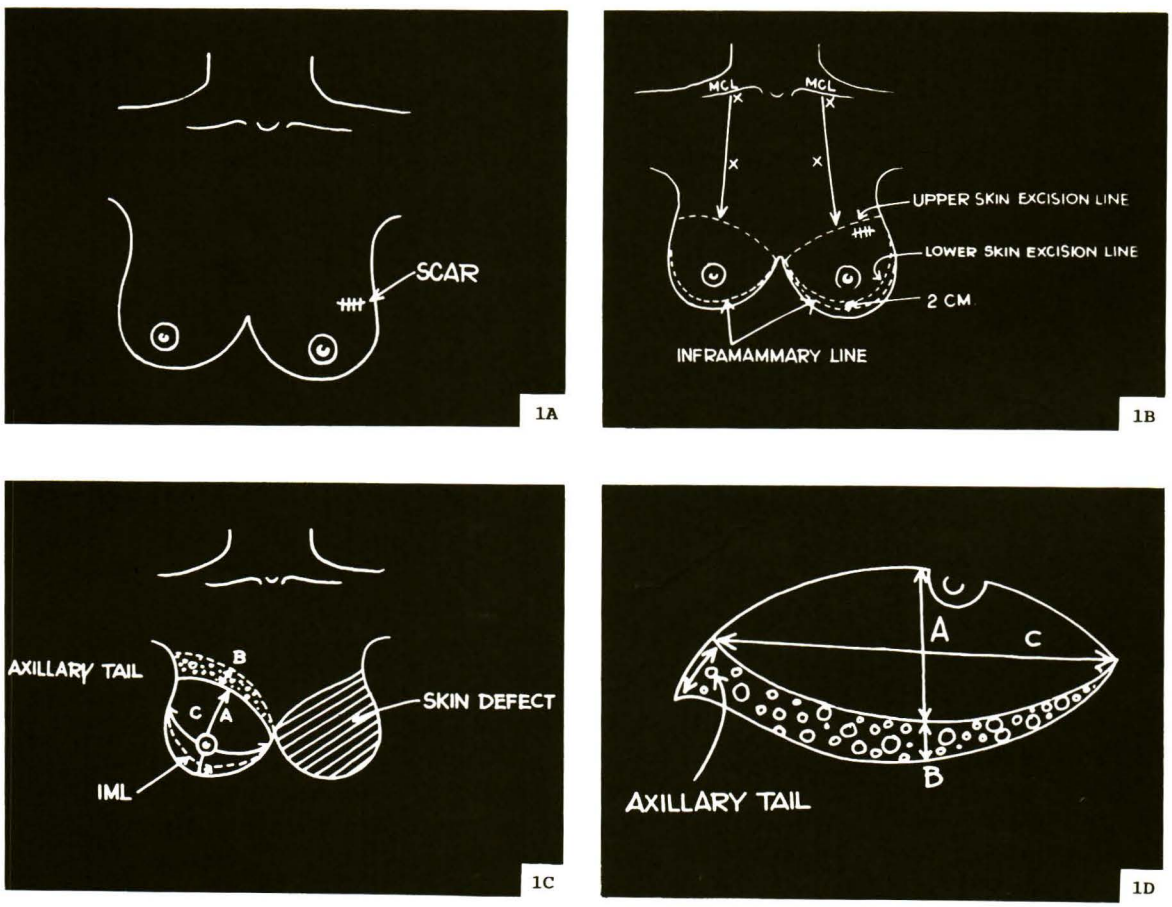


Fig. 1A, 1B, 1C, 1D. **The pre-operative planning for modified radical mastectomy with immediate breast reconstruction with free TRAM flap.**

graphy in follow-ups and for detection of the recurrence in the post-reconstruction breast is also discussed.

Surgical technique of breast reconstruction with free TRAM flap

Pre-operative planning

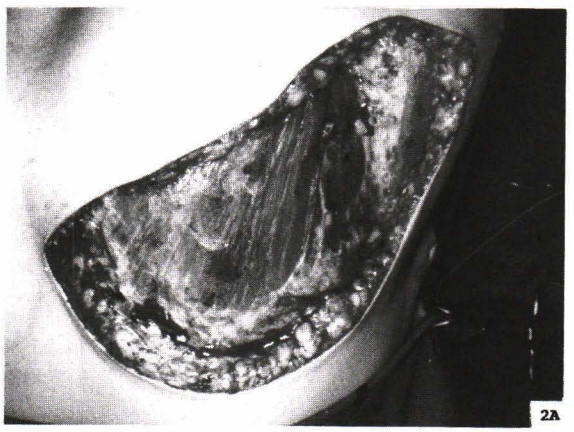
The lower margin of the incision at the inframammary fold on the mastectomy site (Fig. 1A) was marked a few centimeters higher than the opposite side and the upper margin was marked to include the incision of the biopsy site (Fig. 1B). A measurement of the remaining breast was performed to measure the dimension of the skin component required in both vertical height and transverse dimension. The extent of the axillary tail was also estimated (Fig. 1C). The measurement on the abdomen performed by the dimension of the flap was estimated from the remaining breast (Fig. 1D).

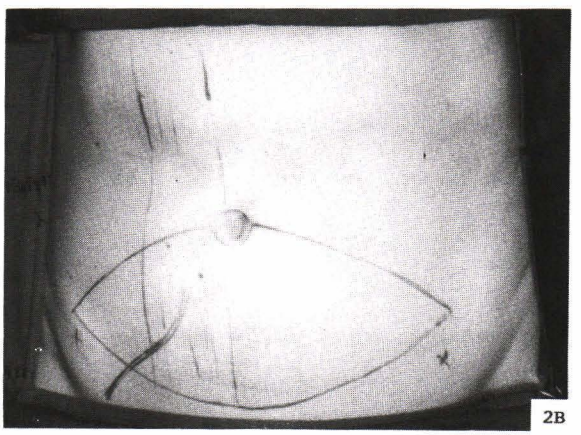
Surgical technique of reconstruction of the breast mound with free TRAM flap

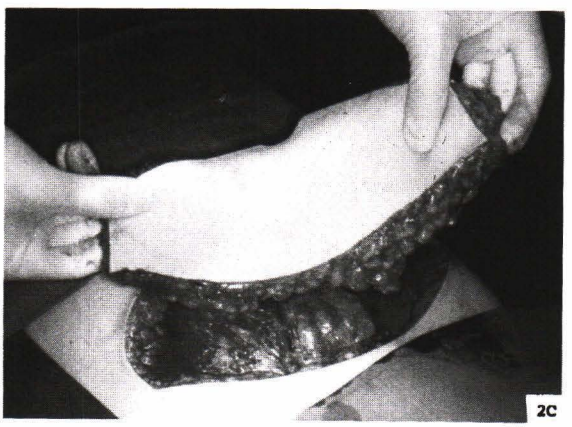
Total mastectomy with axillary node dissection was performed using the above incision (Fig. 2A). The axillary vessels were preserved to be anastomosed with the free flap. The free TRAM flap was harvested from the lower abdomen using the vascular pedicle of inferior epigastric vessels with deepithelialization of the part to be used for the axillary fold (Fig. 2B and 2C). The vessels of the flap were anastomosed with the axillary vessels without a vein graft. The transposition of the flap to the chest wall is shown on Fig. 2D.

Surgical technique of the nipple and areolar reconstruction and mastopexy of the contralateral breast

The pre-operative marking of the new nipple site and the planned mastopexy of the contralateral breast were performed (Fig. 3A). The nipple recon-







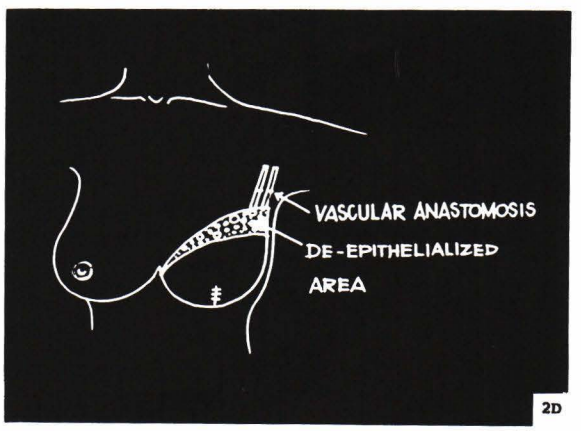
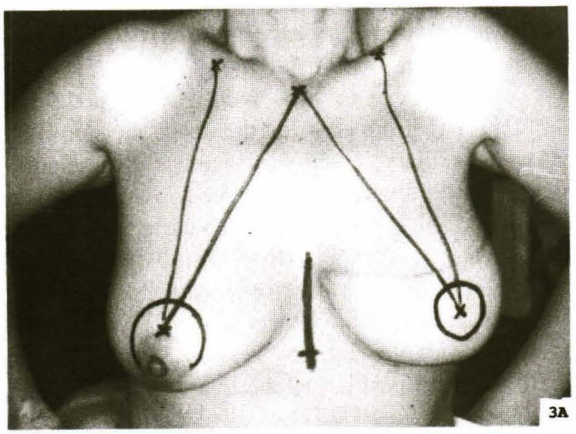
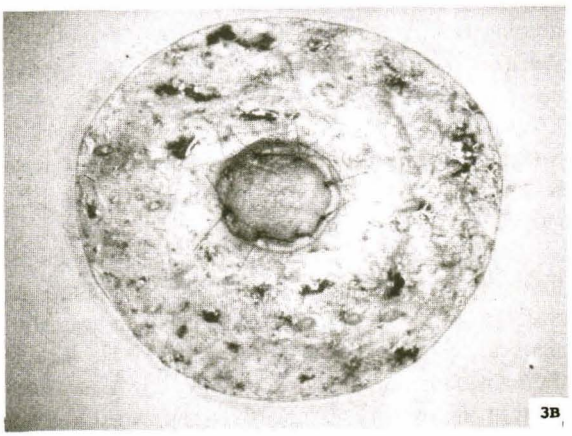
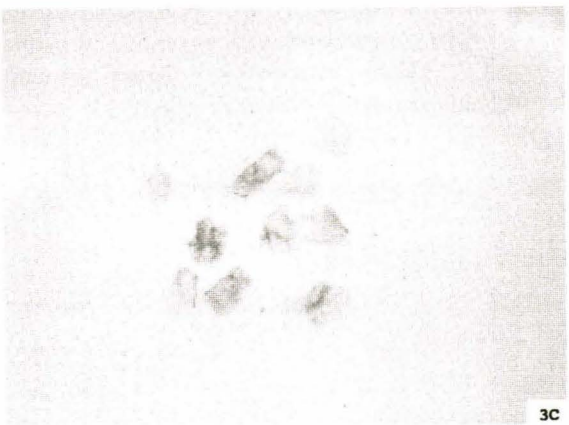
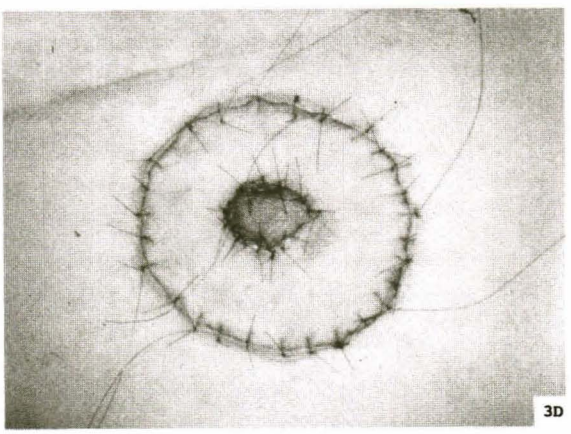


Fig. 2A, 2B, 2C, 2D. Surgical technique of the reconstruction of breast mound using free TRAM flap.









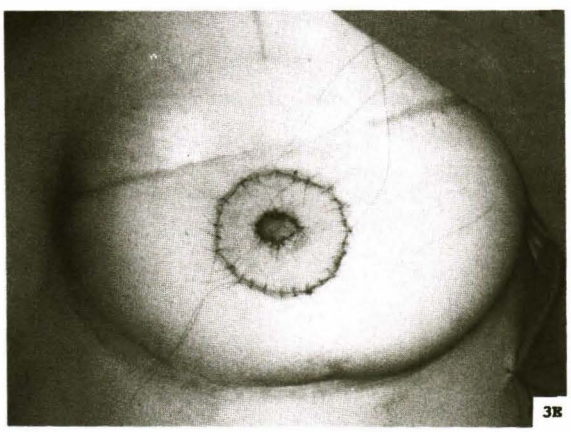


Fig. 3A, 3B, 3C, 3D, 3E, 3F. **Surgical technique of nipple and areolar reconstruction and mastopexy of the contralateral breast.**

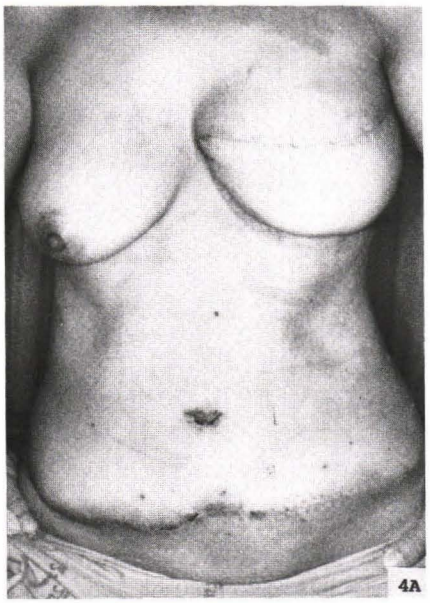
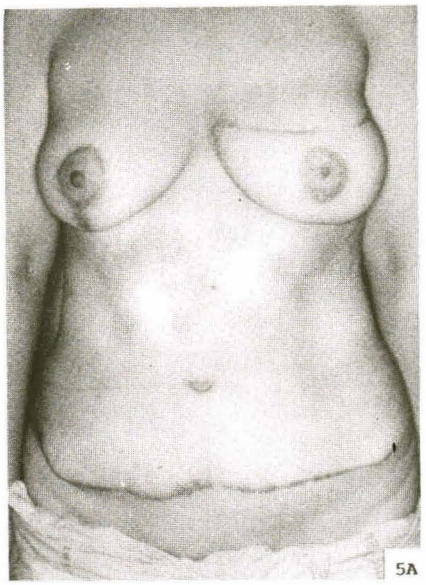


Fig. 4A, 4B. Post-operative photographs of the patient after reconstruction of breast mound with free TRAM flap.

struction was performed by using the nipple sharing technique from the nipple of the contralateral side (Fig. 3B). Multiple pieces of small conchal cartilage grafts were harvested to be inserted and slipped randomly under the reconstructed areolar to simulate the Montgomery glands (Fig. 3C). A full-thickness skin graft from the upper inner thigh skin was used for areolar reconstruction (Fig. 3D and 3E). Right mastopexy was performed to achieve symmetry of breast and nipple position (Fig. 3F).

CASE REPORT

A 42-year old female patient was admitted to Srinagarind Hospital, Khon Kaen University in October 1990 with a history of a previous biopsy of a 2 centimeter lesion from the upper outer quadrant of her left breast performed in a provincial hospital. Pathology showed an infiltrating ductal carcinoma with a diagnosis of Stage II cancer of the left breast. Immediate breast reconstruction after modified radical mastectomy was planned after discussion with the patient. On pre-operative examination, a surgical scar was noted at the upper outer quadrant with no residual lump on her left breast or any axillary lymph node enlargement. On October 1990, a total mastectomy with axillary node dissection was performed with an immediate breast reconstruction using free TRAM flap. Post-operative photographs are shown in Fig. 4A and 4B. Subsequent nipple and areolar reconstructions were performed three months later by the nipple sharing technique using the right nipple; and a full thickness skin graft from the upper inner aspect of the thigh. Right mastopexy was also performed on the contralateral breast to achieve symmetry in both breast size and nipple position. There was no revision of the breast at any subsequent time. The patient also received adjuvant chemotherapy. The patient came to the hospital for regular follow-ups. Post-operative pictures in September 1991 (Fig. 5A and 5B), January 1994 (Fig. 6A and 6B) and January 2000 (Fig. 7A and 7B) are shown. A bone scan, ultrasonography of the liver and a chest X-ray were performed in July 1999. The follow-ups showed a normal X-ray report, normal bone scan, and no evidence of liver metastasis on the upper abdomimal ultrasound. Mammographies were performed in July 1995 and July 1999. The studies revealed predominantly fatty tissue due to the surgical procedure of autogeneous breast reconstruction in the left breast (Fig. 8A and 8B). A small cystic lesion was noted in the upper outer quadrant of the right breast. The most recent follow-up took place in February 2000, (in the 10th post-operative year) and revealed the patient to be



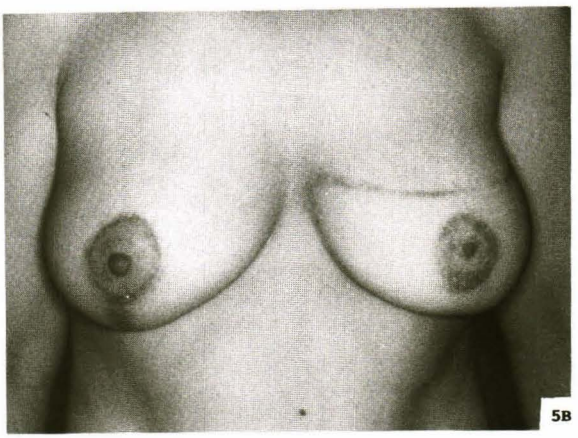


Fig. 5A, 5B. **Photographs of the patient after nipple and areolar reconstruction, one year post-operatively.**

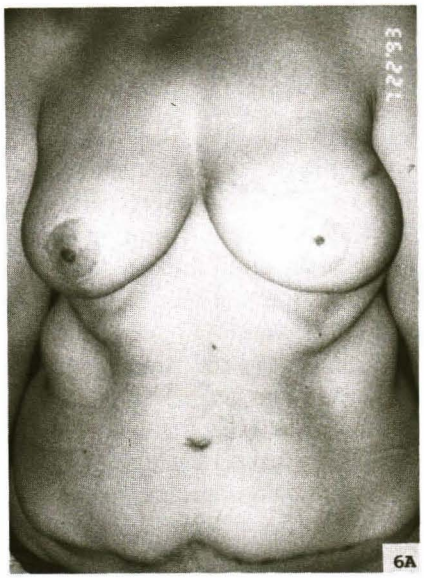


Fig. 6A, 6B. **Photographs of the patient, 4 years post-operatively.**

free of the disease with no evidence of the residual or recurrent tumor. She was also very happy with the esthetic feature of both postreconstruction and contralateral breast.

DISCUSSION

There are various ways to perform breast reconstruction, however, immediate breast reconstruction is becoming increasingly accepted as the recommended method. Candidates for this technique are patients who are in good general health and have stage I to II disease determined primarily by the size and location of the tumor. Discussion should take place between the surgeon and patient to determine if the patient is a suitable candidate. The patient should be encouraged to choose a technique

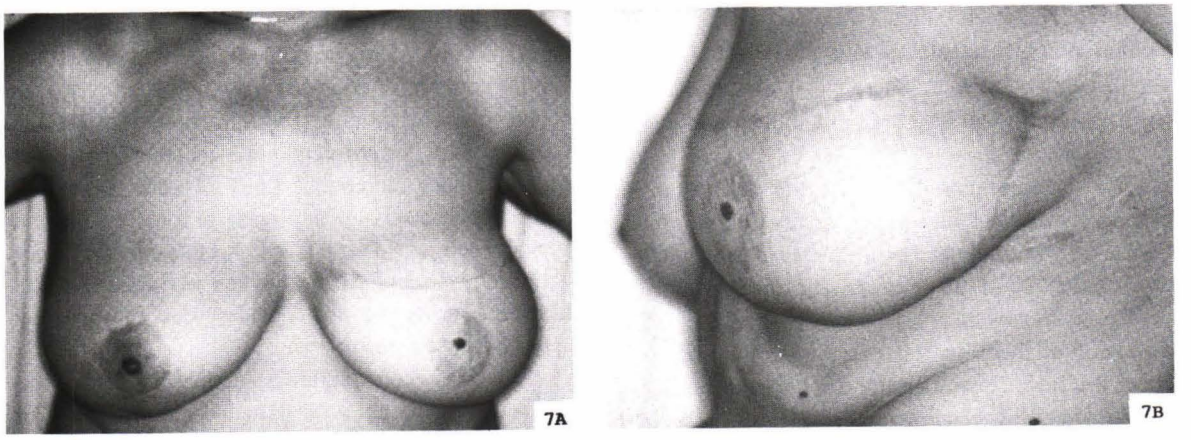


Fig. 7A, 7B. Photographs of the patient, 10 years post-operatively.

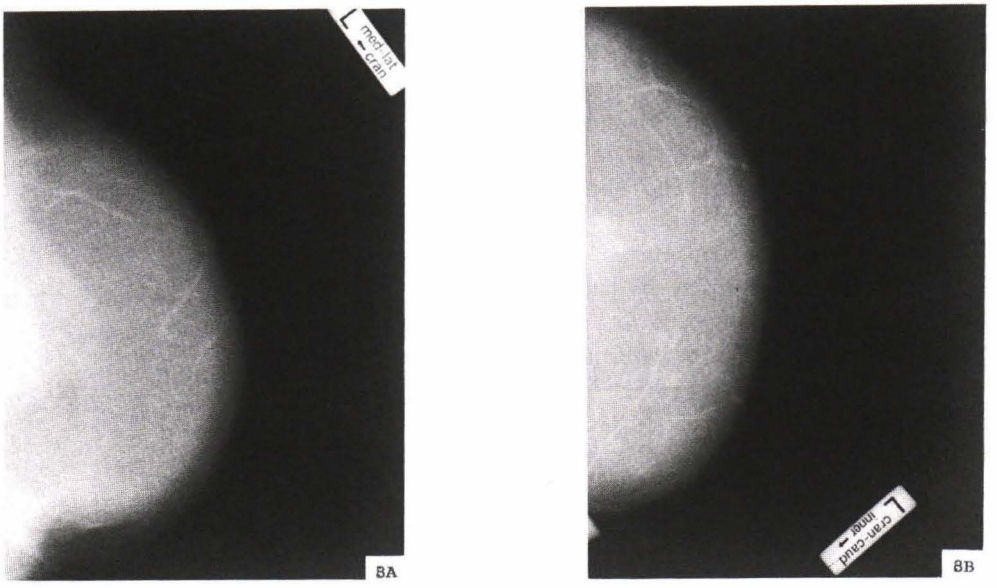


Fig. 8A, 8B. Mammography of the patient, 9 years post-operatively.

based on her goals and understanding of the advantages and disadvantages of each technique.

However, microsurgical free tissue transfer was introduced as the most advanced form of immediate breast reconstruction and in 1989, Grotting presented the experience using free TRAM flap for immediate breast reconstruction as well as indications and contraindications, pre-operative preparation and surgical technique[4]. Presently, immediate breast reconstruction is routinely offered in many centers. In 1996, at the University of Texas M.D. Anderson Cancer Center, approximately one-third of the total number of mastectomies performed received immediate breast reconstruction[2].

Women who undergo immediate postmastectomy reconstruction have a similar rate of survival as patients who do not have reconstruction[9]. There was no significant difference in the recur-

rence rates between patients who had a skin sparing technique for mastectomy and those who did not (10). Neoadjuvant chemotherapy has not been shown to cause additional morbidity in immediate breast reconstruction(11).

Recommendations for the follow-up of patients who have had breast reconstructions have been made. Follow-ups should target the early detection of the recurrent or metastatic disease and the detection of new primary breast cancer. This may be accomplished by the patient conducting self-checks, clinical examination, and laboratory testing supplemented by imaging studies. Clinical follow-up trials of women who have undergone breast reconstructive surgery show no evidence that locally recurrent breast carcinoma is masked when compared with follow-ups of women who did not undergo reconstructive procedures(12). However, Mund DF, et al (1994) reported the development of recurrent carcinoma after a mastectomy and TRAM flap. The lesion was non-palpable and was detected by mammography. It raised the recommendation for the practice of performing postreconstruction mammography for detection of local recurrence after mastectomy(13).

The findings of post-reconstruction mammography have been reported. From the mammography, the autologous myocutaneous flap has a predominently fatty appearance with variable density due to the connective tissues and vascular structures in no orderly arrangement as well as the muscle component and post-operative scaring. Other normal mammographic findings may include the vascular pedicle, surgical clips and surgical scars which produce radiopaque lines in predictable locations. Fat necrosis appearing as a spiculated mass, noncalcified or calcified lipid cysts, calcifications, lymph nodes, epidermal inclusion cysts, and locally recurrent carcinoma are considered as an abnormal mammographic result(14).

Postreconstruction mammography is recommended for patients with palpable abnormalities or for patient anxiety. It also continues to be a useful method for identifying a post-operative complication such as fat necrosis and to differentiate it from tumor recurrence(15).

In conclusion, this article describes a successful immediate breast reconstruction using the free TRAM flap as well as details of the surgical technique and the long-term follow-up with radiologic imaging of the postreconstruction breast. Immediate breast reconstruction is safe to be routinely offered and universally considered a standard part of breast cancer treatment.

ACKNOWLEDGEMENT

The authors wish to thank Mr. Hayden Sharp for his assistance with the English presentation of the paper.

(Received for publication on September 15, 2000)

REFERENCES

1. Georgiade G, Georgiade N, McCarty KS Jr, et al. Rationale for immediate reconstruction of the breast following modified radical mastectomy. Ann Plast Surg 1982; 8: 20-8.
2. Miller MJ. Immediate breast reconstruction. Clin Plast Surg 1998; 25: 145-56.
3. Schusterman MA. The free TRAM flap. Clin Plast Surg 1998; 25: 191-5.
4. Grotting JC, Urist MM, Maddox WA, Vasconez LO. Conventional TRAM flap *versus* free microsurgical TRAM flap for immediate breast reconstruction. Plast Reconstr Surg 1989; 83: 828-41.
5. Arnez ZM, Bajec J, Bardsley AF, Scamp T, Webster MH. Experience with 50 free TRAM flap breast reconstructions. Plast Reconstr Surg 1991; 87: 470-8; discussion 479-82.
6. Paulson RL, Chang FC, Helmer SD. Kansas surgeons' attitudes toward immediate breast reconstruction: A statewide survey. Am J Surg 1994; 168: 543-6.
7. Banic A, Boeckx W, Greulich M, et al. Late results of breast reconstruction with free TRAM flaps: A prospective multicentric study. Plast Reconstr Surg 1995; 95: 1195-204; discussion 1205-6.
8. Srax P. Imaging. Follow-up of breast cancer reconstruction cases. Cancer 1991; 68 (Suppl 5):

1157-8.
9. Noguchi M, Fukushima W, Ohta N, et al. Oncological aspect of immediate breast reconstruction in mastectomy patients. J Surg Oncol 1992; 50: 241-6.
10. Carlson GW, Grossl N, Lewis MM, et al. Skin sparing mastectomy: Oncologic and reconstructive considerations. Ann Surg 1997; 225: 570-5.
11. Forouhi P, Dixon JM, Leonard RC, et al. Prospective randomized study of surgical morbidity following primary surgical therapy for breast cancer. Br J Surg 1995; 82: 79-82.
12. Wood WC. Nonimaging aspects of follow-up in breast cancer reconstruction. Cancer 1991; 68: 1164-6.
13. Mund DF, Wolffson P, Gorczyca DP, et al. Mammographically detected recurrent nonpalpable carcinoma developing in transverse rectus abdominis myocutaneous flap: A case report. Cancer 1994; 74: 2804-7.
14. Hogge-JP, Zuurbier-RA, de-Paredes ES. Mammography of autologous myocutaneous flaps. Radiographics 1999; 19: S63-72.
15. Leiberman AJ, Styblo TM, Boswick J 3rd. Mammography of the postreconstruction breast. Plast Reconstr Surg 1997; 99: 698-704.

การเสริมสร้างเต้านมในทันทีโดยการย้ายแผ่นเนื้อแบบ Free TRAM Flap: รายงานผู้ป่วย 1 ราย รวมทั้งการติดตามผลการรักษา 10 ปี และภาพถ่ายทางรังสีวินิจฉัย

บวรศิลป์ เชาวน์ชื่น, พ.บ., บธ.ม., ปรารถนา เชาวน์ชื่น, พ.บ.***

การเสริมสร้างเต้านมโดยการใช้การย้ายแผ่นเนื้อเยื่อจากหน้าท้องแบบจุลศัลยกรรม (free microsurgical transverse rectus abdominis myocutaneous flap (free TRAM flap)) พร้อมกับการผ่าตัดมะเร็งเต้านม เริ่มได้รับการยอมรับมากขึ้น ผู้นิพนธ์รายงานผู้ป่วย 1 รายที่ได้รับการผ่าตัดโดยวิธีนี้ และติดตามเป็นเวลา 10 ปี ได้ผลของการรักษาดีมากทั้งทางด้านความสวยงาม และผลของการรักษามะเร็ง วิธีการผ่าตัดได้ถูกนำเสนอทั้งในขั้นตอนของการเสริมสร้างเนื้อเต้านมและการผ่าตัดครั้งต่อมาซึ่งเป็นการเสริมสร้างหัวนมและฐานหัวนมรวมถึงการยกระดับของหัวนมอีกข้างหนึ่ง ลักษณะการตรวจพบทางภาพถ่ายรังสีเต้านม (Mammography) ได้ถูกนำเสนอรวมถึงการติดตามผู้ป่วยโดยการใช้ภาพถ่ายทางรังสีเต้านม จากความสำเร็จของการรักษาและการติดตามผู้ป่วยเป็นเวลานานนี้ ผู้นิพนธ์จึงเสนอวิธีการเสริมสร้างเต้านมโดยการใช้การย้ายแผ่นเนื้อจากหน้าท้องแบบจุลศัลยกรรมพร้อมกับการผ่าตัดมะเร็งเต้านมนี้ เป็นการรักษาที่เป็นทางเลือกอย่างหนึ่งของการรักษามะเร็งเต้านม

คำสำคัญ : การเสริมสร้างเต้านม, การย้ายแผ่นเนื้อจากหน้าท้องแบบจุลศัลยกรรม, การติดตามระยะยาว, การตรวจพบทางภาพถ่ายรังสีเต้านม

บวรศิลป์ เชาวน์ชื่น, ปรารถนา เชาวน์ชื่น
จดหมายเหตุทางแพทย์ ฯ 2544; 84: 1037-1045

* สาขาวิชาศัลยศาสตร์ตกแต่ง, ภาควิชาศัลยศาสตร์,
** ภาควิชารังสีวิทยา, คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น, ขอนแก่น 40002