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Surgical Resection With Pedicled Rotation Flap for Post-mastectomy Locoregional Breast Cancer Recurrence

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Abstract. *Background/Aim: Locoregional recurrence (LRR) of breast cancer is reported to occur at a rate of 5%-15%. Wide excision of LRR is the recommended treatment, which can increase the probability of subsequent local control. Herein, we describe a surgical technique wherein a pedicled skin and subcutaneous flap close the skin defect after resection of a breast cancer LRR without use of a skin graft. Patients and Methods: We reviewed four patients who underwent surgical resection using a pedicled rotation flap for chest wall recurrence after mastectomy. Results: The surgical margin was set 2 cm apart from the tumor margin. After resection of tumor from the chest wall, we formed an adjacent pedicled flap and rotated the flap to the skin defect. There were no post-operative complications, including wound necrosis. Conclusion: Surgical resection with a pedicled rotation flap for post-mastectomy breast cancer LRR is a highly feasible way to achieve complete resection.*

Breast cancer recurrence is a problem for breast cancer patients because of the resistance to treatment. Locoregional recurrence (LRR), as a first recurrent site of breast cancer, is reported to occur at a rate of 5%-15% after conservative breast surgery or mastectomy and adjuvant radiotherapy (1, 2). Further, the most frequent site of recurrence in the breast is the original quadrant or the chest wall scar after radical surgery, accounting for 60%-95% of all LRRs (2, 3).

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Wide excision of a LRR lesion is recommended as treatment to increase the probability of subsequent local control (2); however, surgical resection of a LRR with negative margins after mastectomy can be a difficult procedure because skin transplantation is needed for the resected skin defect. Indeed, reconstruction with a pedicled flap is a highly feasible method, yet a detailed method has not been reported. Herein, we describe a surgical technique with pedicled skin and a subcutaneous flap, which is suitable to close a skin defect after resection of post-mastectomy LRR in patients with breast cancer.

Patients and Methods

Characteristics of patients. We reviewed four patients who underwent surgical resection using a pedicled rotation flap for an isolated chest wall LRR after mastectomy in our Department. The characteristics of the patients are shown in Table I. The mean age was 65 years (range=50-76 years), the mean disease-free interval was 127 months (range=40-238 months), and the mean size of the recurrent tumor was 2.0 cm (range=1.0-3.4 cm). None of the patients had metastatic lesions other than the solitary LRR. The range of resection was based on the pre-operative diagnosis. In all cases, we resected skin, subcutaneous tissue, and the major pectoral muscle; we resected a rib in only one case. The depth of invasion of any of the recurrent tumors did not extend beyond the muscle in any case.

Surgical procedures. The surgical procedure is depicted in Figure 1. The surgical margin was reported to be 2 cm from the tumor margin. To avoid forming a dog ear, we added a small triangle resection area to the root of the pedicle and resected a tear-drop form (Figure 1a). The pedicled skin and fat flap were planned along the resected margin and the size was set as the same of that of the resected skin (Figure 1b). The cancerous area, subcutaneous fat, and pectoral muscle were resected from the chest wall. Then, a pedicled flap was harvested and rotated into the defect on the cranial side (Figure 1c). Closed suction drainage was placed on the chest wall. Simple stitches were added in both the fatty tissue and skin (Figure 1d, e).

Table I. *Characteristics of patients*.

Case	Age	BMI	Stage of primary cancer	Subtype of primary cancer	Disease free interval (months)	Size of recurrenct tumor (cm)	Pathological evaluation of invasion
1	67	35.2	T1N1M0	ER+ PgR– HER2–	170	1	Fat
2	76	18.8	T1N0M0	ER+ PgR– HER2–	59	1	Muscle
3	50	23.9	T2N1M0	ER+ PgR+ HER2+	40	2.5	Muscle
4	68	25.7	T1N2M0	Not available	238	3.4	Muscle

Table II. *Characteristics of patients*.

Case	Operation procedure	Operation time (min)	Bleeding (ml)	Therapy after resection of recurrent tumor	Observation time after resection of recurrent tumor (months)	Recurrence after second surgery	Alive or dead
1	Skin and muscle resection	70	0	ET and RT	8	None	Alive
2	Skin and muscle resection	68	5	ET and RT	51	None	Alive
3	Skin, muscle and rib resection	174	0	CT with trasutuzmab and RT	55	Mediastinum lymph node (PFS: 3 months)	Alive
4	Skin and muscle resection	72	0	ET	51	None	Alive

Results

Details of the operation and postoperative treatment are shown in Table II. The mean operative time was 96 min; the mean operative time for the 3 operations without limb resection was 70 min. The intra-operative bleeding was nil and there were no post-operative complications, including wound necrosis. After the LRR tumor resection, all patients had systemic therapy according to the tumor subtype of the recurrent lesion. None of the patients had post-mastectomy radiation therapy (PMRT) after the first surgery. Three of four patients had PMRT after resection of the recurrent tumor. One patient did not undergo PMRT after the second surgery at the patient's request. No patient had a LRR after the second surgery, but one patient had distant metastases to mediastinal lymph nodes 3 months after the second surgery. All patients were alive and well during the observation period [mean duration, 41 months (range=8-55 months)].

Discussion

A locoregional chest wall recurrence after mastectomy is a frequent form of breast cancer recurrence (2, 3). For patients with an isolated chest wall recurrence, surgical resection is considered to be the mainstay of therapy (4). It has been shown that complete tumor resection with a safe margin is associated with better outcomes (5), but to achieve a safe tumor margin, the skin defect is large and skin grafting is often needed for skin closure. Because skin grafting is a troublesome procedure and there is a risk of graft necrosis, easier and safer methods of resection are needed for breast cancer patients.

Flaps are an indispensable tool in wound closure by reducing and redirecting tension. A rotation flap is a procedure in which the flap is pivoted around an axis to close a primary defect, essentially rotating the skin into the defect (6). A rotation flap is used when simpler types of closure, such as healing by secondary intention, a primary closure, or a skin graft, do not yield adequate functional and cosmetic results (6). Herein, we have described a surgical technique with a pedicled rotation flap to provide an adequate resection margin and close the resulting skin defect in breast cancer patients with a post-mastectomy LRR. With this procedure we achieved an acceptable margin from the tumor and removed the recurrent lesion completely. Although the limit of resection size is unknown, the maximum size of resection was 10×8 cm based on our experience. It might be undesirable to make a skin flap that is too large because ischemic graft necrosis may develop. In our procedure, skin extension was needed; however, it might be difficult to use our technique if patients had received PMRT after the first surgery and had a skin reaction. None of our patients received radiation

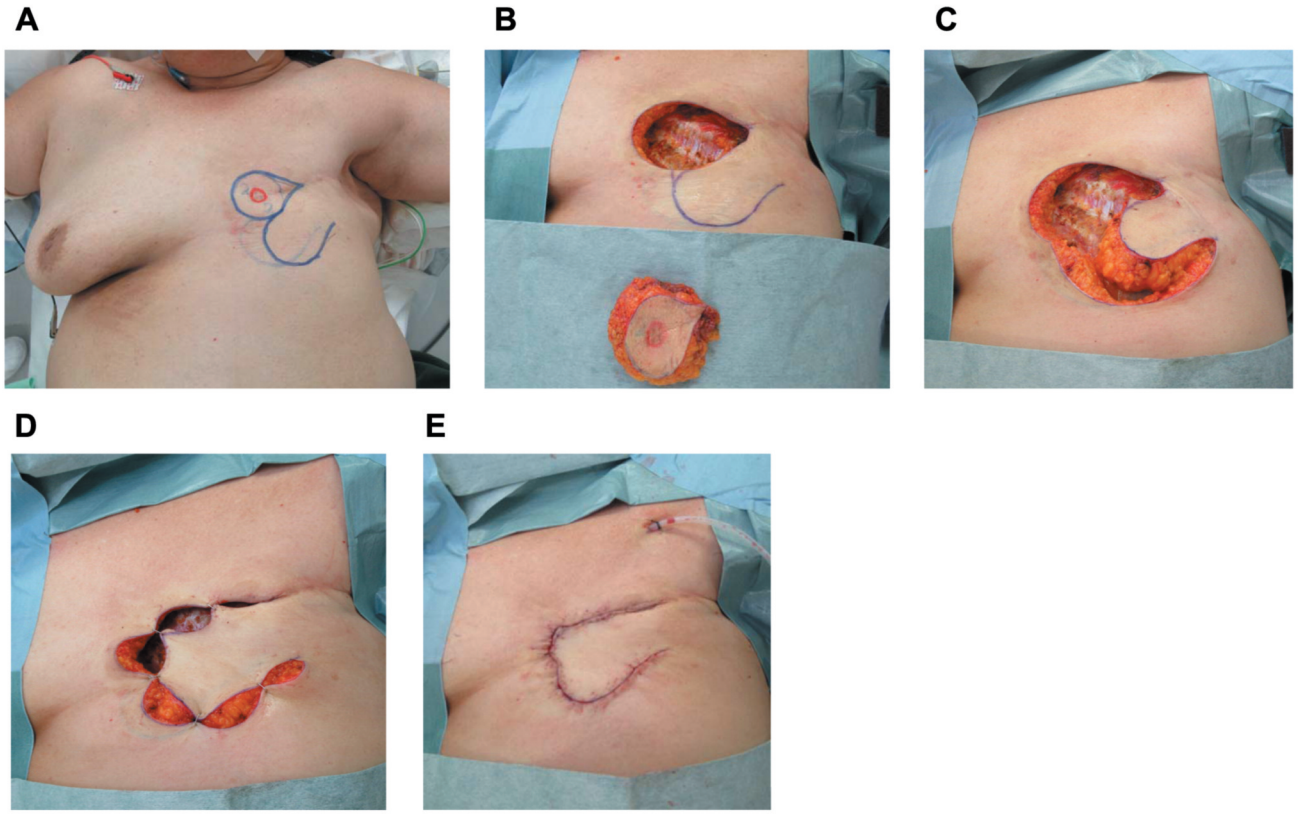

Figure 1. *The surgical procedure is shown. The surgical margin is set 2 cm apart from the tumor margin. The pedicled skin and fat flap were set along the resected margin and the size was set at the same size of the resected skin (a). After the tumor was resected (b), the pedicled flap was formed (c). The wound had some tension (d), but enabled us to perform a simple closure without a skin graft (e).*

therapy before the second operation, and therefore the effects of radiation therapy on our technique, if any, are unknown. Additionally, our technique might be difficult for patients with a slender body habitus because flap extension may not have enough stretch.

With systemic therapy after resection of an isolated LRR, the CALOR trial showed that chemotherapy improves the prognosis and adjuvant chemotherapy is recommended, especially if the recurrence is ER-negative (5). We selected endocrine therapy for ER-positive patients, and chemotherapy with trastuzumab for HER2-positive patients. We chose the above systemic therapy regimen based on the recurrent tumor status. It was interesting that ER- or HER2-positivity changed in two of three patients, and new information was added in one patient with an unknown primary tumor sub-type because her breast cancer was resected 20 years earlier.

Irradiation after resection for a locoregional chest wall recurrence is recommended if the patient did not receive PMRT (7). None of our patients received PMRT, but 3 of 4 patients received 50 Gy of irradiation after resection of the locoregional chest wall recurrence. One patient did not undergo irradiation at her request. Distant metastases occurred 3 months after LRR resection in one patient, but all patients were alive and well during our mean observation period of 41 months (range=8-55 months). None of the patients had locoregional re-recurrences.

Surgical resection with a pedicled rotation flap for post-mastectomy locoregional breast cancer recurrence is a feasible way to achieve complete resection.

Conflicts of Interest

The Authors have no conflicts of interest to declare regarding this study.

Authors' Contributions

Conception and design: YS and YK. Acquisition of data: YS, AN, YN, HS, AN, KM and TO. Writing, review, and/or revision of the manuscript: YS, TO and YK.

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