Case Report

Immediate breast reconstruction with expander following recurrent lesion resection and exchange to silicon breast implant in a pregnant triple negative breast cancer patient: case report

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Abstract: A 39-year-old gravida 1 para 1 pregnant Japanese woman underwent skin-sparing mastectomy and axillary lymph node dissection with immediate breast reconstruction (IBR) using a tissue expander (TE) at 32 weeks of pregnancy under general anesthesia. Inserted TE (300 cc) was expanded during breast feeding while the volume was 240 cc of the resected breast tissue. One month after delivery, 2 months after surgery, the contralateral healthy breast increased in size and the inframammary line was deviated toward a caudal site which was larger than 300 cc-inflated TE. She stopped breast feeding to receive a systemic chemotherapy after one months-breast feeding. At 3 months after delivery, the healthy breast size was smaller than the 250 cc-expanded breast and both the inframammary lines were at the same level. She was diagnosed local recurrence 3 month-postoperatively, so we resected the recurrent lesion and exchanged TE to silicon breast implant immediately. Finally, a good symmetry was obtained after insertion of the 220 cc SBI. At an IBR using TE, we should know the dynamic change of breast volume and the level of inframammary line of the healthy breast during those phases of pregnancy, delivery, and nursing.

Keywords: Breast cancer; pregnancy; immediate reconstruction; silicon breast implant; case report

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Introduction

The rate of breast cancer during pregnancy (BCP) is expected to rise as more women delay childbearing (1). This observation is congruent with the known relationship between late parity, age, and breast cancer. Immediate breast reconstruction (IBR) after mastectomy for breast cancer is currently considered an essential component in managing breast cancer patients. However, only a few studies have evaluated the feasibility of IBR in patients of BCP (2-6).

It was difficult to know the change of breast size, shape, and the level of inframammary line during pregnancy. We here experienced a BCP patient received an IBR using TE. We learnt from her the dynamic change of breast volume and the level of inframammary line of the healthy breast during those phases of pregnancy, delivery, and nursing. This is the first report to describe in detail the operation procedure.

We present the following case in accordance with the CARE reporting checklist (available at http://dx.doi.org/10.21037/gs-20-217).

Case presentation

Diagnosis

A 39-year-old gravida 1 para 1 pregnant Japanese woman noticed a breast mass located on the outer-lower quadrant

Table 1 The time line of pregnancy and breast cancer treatment

Date	Pregnancy	Diagnosis and treatment of breast cancer
August, 20xx	27 weeks of pregnancy	Notice a right breast mass
	28 weeks of pregnancy	Diagnosis of breast cancer
September, 20xx	31 weeks of pregnancy	Introduction to our hospital
	32 weeks of pregnancy	SSM, Ax, immediate breast reconstruction using TE
October, 20xx	37 weeks of pregnancy	Delivery
December, 20xx		Diagnosis of local relapse, giving up breast feeding
January, 20xx+1		Local resection of the recurrent lesion
February, 20xx+1		Exchange TE to SBI
March, 20xx+1		Postoperative systemic chemotherapy
December, 20xx+4		Postoperative 4 years, Free from recurrence

SSM, skin sparing mastectomy; Ax, axillary lymph node dissection; TE, tissue expander; SBI, silicon breast implant.

area of the right breast at 27 weeks of pregnancy. She went to a hospital and was diagnosed as having invasive breast carcinoma by core needl1e biopsy (CNB). She was referred to Kagoshima University for further examination of breast cancer during pregnancy (BCP) at 31 weeks of pregnancy. She had an experience of delivery and breast feeding at the age of 30. She had no family history of breast cancer. Ultrasonography revealed that the mass lesion was located on the upper area of the right breast and there was no evidence of lymph node metastasis. CT and bone scintigraphy to detect distant metastases were not performed. She was diagnosed as having T1cN0Mx BCP, according to the TNM classification (7). The time line of this patient's procedure of pregnancy and breast cancer treatment were shown in *Table 1*.

Immediate breast reconstruction (IBR) using tissue expander (TE)

She underwent skin-sparing mastectomy and axillary lymph node dissection with IBR using a tissue expander (TE) at 32 weeks of pregnancy under general anesthesia (*Figure 1A*). The scarring caused by CNB, which was located on the 3-cm outer edge of the tumor, was removed at the same time. We placed the TE at a level 1 cm lower in comparison to the contralateral healthy breast (*Figure 1B*). The operation was performed without any postoperative complications for the patient or fetus. The volume of resected breast tissue was 240 cc. The pathological diagnosis of the breast cancer was invasive carcinoma, 18 mm, and negative for estrogen receptor, progesterone receptor, and HER2 protein. No lymph node metastasis was seen in the resected 14 axillary lymph nodes. Finally, the patient was diagnosed as pT2N0M0 Stage IIA. There was no evidence of cancer implantation on the CNB scar or cancerous lesions on the resected breast tissue. We planned to add adjuvant systemic chemotherapy after a short period of breast feeding. The inserted expander volume was 300 cc, and 150 cc of normal saline was inflated at the time of surgery.

Diagnosis and treatment of local recurrence

Four weeks after the breast surgery, a healthy baby was born by vaginal delivery at 37 weeks gestational age. One month after delivery, 2 months after surgery, the contralateral healthy breast increased in size (*Figure 1C*). The patient nursed for 2 months.

When the total expander volume inflation was 300 cc, 15 mm of mass was detected by palpation and ultrasonography at 3 months post-operation. It was located close to the resected CNB scar, and mobility was obtained in the subdermal area between the skin and the mass. Fine needle aspiration biopsy gave a positive result (*Figure 2A*,*B*). We suspected that it was local recurrence and performed local resection for the diagnosis and treatment. One centimeter of skin and parenchymal tissue from the edge of the mass were removed (*Figure 2C*). Fifty cc of normal saline was deflated. The results showed local recurrence of breast carcinoma and the deep part of the vertical edge was positive for cancer (*Figure 2D*,*E*,*F*). An ideal expansion was observed at 5 months post-operation and

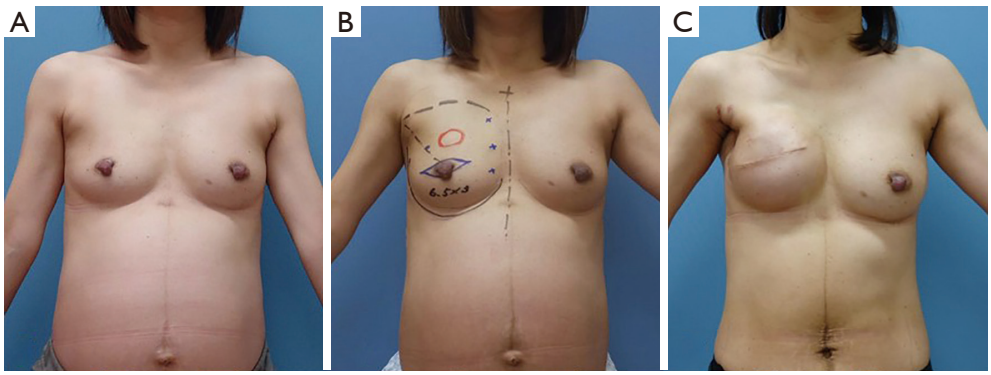

Figure 1 Gross findings pre- and post-delivery. (A,B) 37th week of pregnancy. (C) One month after delivery, 2 months after surgery. The contralateral healthy breast increased in size.

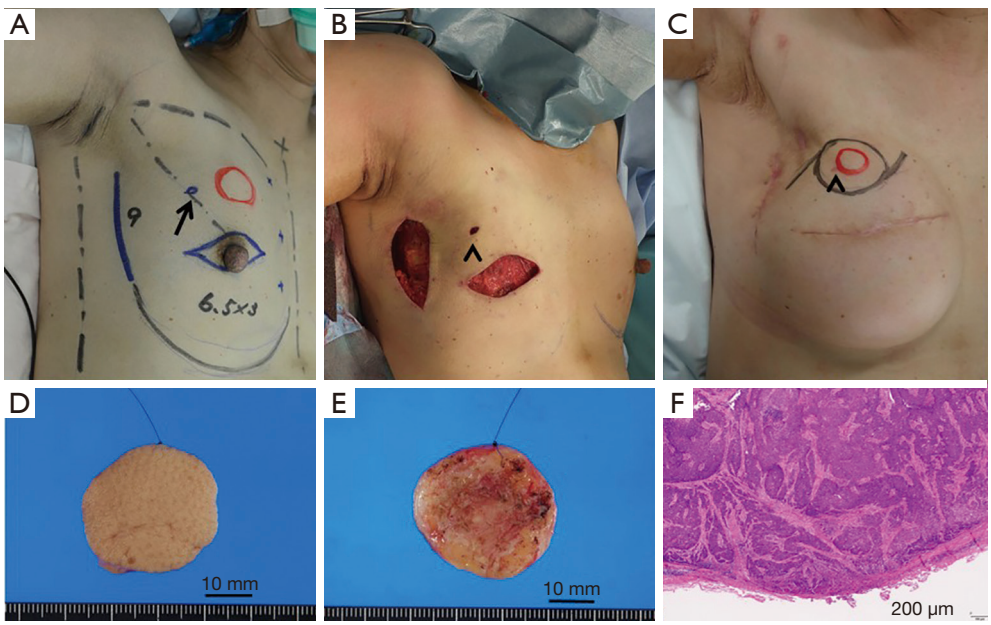

Figure 2 Gross findings before and after primary breast surgery and resected recurrent lesion. (A) Skin-sparing mastectomy and axillary lymph node dissection were performed with the double incision drawn in blue ink. Scarring due to CNB was removed (arrow). A cancerous lesion located on the upper area (red circle). (B) CNB scarring was removed completely (arrow head). (C) A subdermal local recurrence (red circle) was detected on the edge of the CNB scar (arrow head) 3 months after surgery. (D,E) One centimeter of skin and parenchymal tissue were obtained from the removed recurrent lesion. (F) Invasive breast cancer cells were detected with positive involvement of the vertical edge (H & E staining, original magnification ×100).

the patient's healthy left breast decreased in size (*Figure 3A,B*). A deformity due to local resection of the skin appeared on the upper-outer area of the expanded breast (*Figure 3C*).

Exchange of ET for SIB

We performed additional local resection of the right chest area, exchanged the TE for SBI, and reconstructed the nipple and areola. Prior to exchange of the TE for SBI, we performed local resection of the skin for repair of deformity and a part of major pectoral muscle was removed for additional resection of the cancerous lesion (*Figure 4A*). After removal of the TE and insertion of the SBI, the nipple and areola were reconstructed using inguinal-epidermis and half of the contralateral healthy

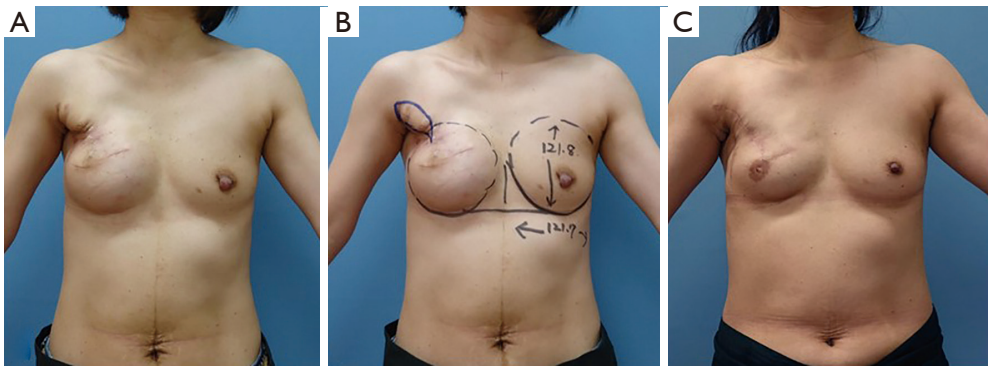

Figure 3 Gross findings post-delivery. (A,B) 1 month after resection of local recurrence, blue line, additional resection line of skin and subdermal tissue, (C) 3 years and 5 months after the initial breast surgery.

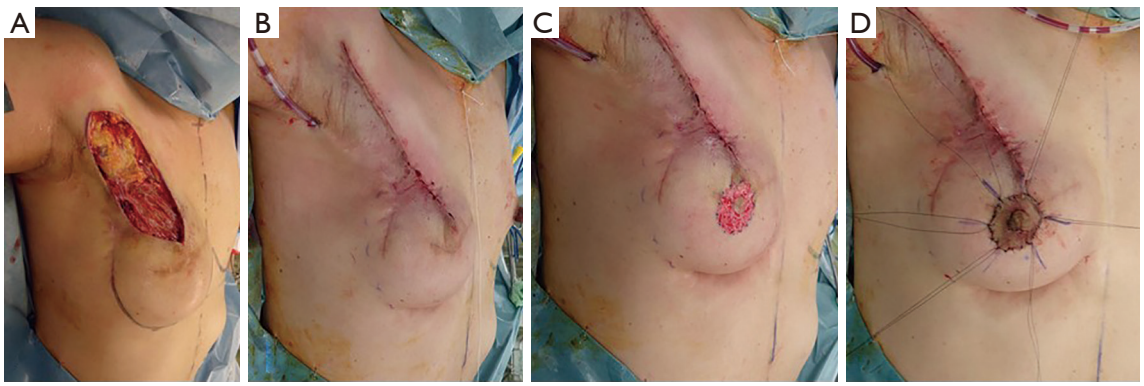

Figure 4 Additional resection at the time of removal of the TE and insertion of the SBI. (A) Prior to exchange of the TE for the SBI, skin and part of the major pectoral muscle were removed together. (B,C,D) After insertion of the SBI, the nipple and areola were reconstructed using inguinal-epidermis and half of the contralateral healthy nipple.

nipple (*Figure 4B,C,D*). Pathologically, there was no residual cancerous lesion on the additional resected tissue. The size of the inserted SBI was 220 cc. The patient underwent adjuvant systemic chemotherapy using epirubicin (60 mg/m^2) and cyclophosphamide (600 mg/m^2) once 3 weeks for 4 times, and docetaxel (75 mg/m^2) once 3 weeks for 4 times after surgery. During and after chemotherapy, no systemic or local complications were seen. Four years after the initial breast surgery, the patient is free from recurrence and the cosmetic result is excellent.

Ethical statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient.

Discussion

Breast cancer during pregnancy (BCP) has been defined as cases of women diagnosed with breast cancer during pregnancy or within 1 year postpartum (8). It is currently the most common malignancy to occur during pregnancy, followed by cervical cancer, melanoma, and haematological malignancy (9). Some studies have found that BCP is more commonly diagnosed at an advanced stage because of increased breast density making clinical examinations and mammography more difficult to interpret (10-12).

Mastectomy was considered the standard surgical procedure in BCP for long time (13). Breast conservation can be selected for patients with BCP diagnosed during the third trimester. For them, breast conservation can be safely

performed and postoperative radiotherapy can be postponed until after delivery without major concerns about a possible detrimental delay (14). On the other hand in patients with BCP diagnosed and operated in the first trimester, breast conservation performed during a very early gestational age is associated with a long delay in postoperative radiotherapy. Chen *et al*. reported a significant relationship between the waiting time for radiotherapy and local recurrence in a systemic review (15). While Amant *et al*. recommended that mastectomy should not be performed just because of the pregnancy itself, and breast conservation should be discussed whenever possible. In patients operated on during the third or even the second trimester, radiation therapy can be safely postponed until after delivery (16).

Currently, there are no available data concerning IBR for pregnant patients undergoing mastectomy for breast cancer. It is well known that IBR decreases the psychological impact of mutilation. That also provides a superior cosmetic outcome and better satisfaction compared to delayed reconstruction, respectively (3,17,18). Although, the unpredictable physiologic changes of the breast during and after pregnancy makes it not suitable for IBR with definitive implant and contralateral reshaping. IBR with autologous tissue should not be considered due to the long operation time and increased risk of blood loss and postoperative complications.

During pregnancy, the contralateral breast size and position of the inframammary line and top of the breast mound dramatically changes. In the study by Lohsiriwat *et al*., seven patients had simultaneous contralateral breast procedures at the time of definitive implant substitution; three had additive mammoplasty and four had contralateral mastopexy (6). In the present case, the contralateral breast size was small without ptosis, so we felt it unnecessary to perform a contralateral operation to maintain symmetry to the reconstructed breast. However, it was difficult to determine the TE size and position, because the breast size, volume, and shape changes during pregnancy. As shown in *Figure 1*, the inframammary line of the healthy breast dramatically changed. At 1 month after delivery, the healthy breast was obviously larger than the 300 cc-expanded right breast (*Figure 1C*). At 3 months after delivery, the breast size was smaller than the 250 cc-expanded breast and both the inframammary lines were at the same level (*Figure 1D*,*E*). Finally, good symmetry was obtained after insertion of the 220 cc SBI (*Figure 1F*).

We add our present case to Lohsiriwat's case and summarized the clinical results as *Table 2*. Out of 13 BCP patients, 9 completed expander inflation during pregnancy, and eventually underwent definitive implant positioning. The time from insertion to substitution of the expander was ranged from 10 to 32 months (6). Remaining four, our case was exchanged from TE to SBI after delivery and other three were still inflating their TE. They had a plan for definitive implant substitution procedure in the following months at the time of the literature submitted. We were able to observe the breast size and shape at pregnancy period, just after delivery, during breast feeding and after giving up breast feeding. From this experience we aware that it is adequate selection for a BCP patient with non-ptotic and small breast to receive inflation of TE during pregnancy, after delivery and nursing. On the other hand for patients with ptotic and/or large breast, it would be necessary for them to add some reduction operations to the contralateral healthy breast to achieve a symmetrical result like Lohsiriwat's cases.

Two patients developed local recurrence and two other patients developed distant metastasis. Of the four patients diagnosed with local or distant recurrence, two were luminal type, one was HER2 type, and one was TN type (*Table 2*). The disease-free interval ranged from 3 to 39 months, which is relatively short. Especially in the present case, local recurrence due to needle tract implantation was detected only 3 months after surgery. In spite of there being no cancerous lesion on the resected CNB scar, recurrence occurred just under the dermis close to the CNB scar. In cases where the lesion is thought to have a high malignant potential, such as TN, it may be necessary to remove the skin adjacent to a lesion surgically.

Strength and limitation

In this case, the breasts were not so large without ptosis even the late gestation. We aware that this procedure would not be bring excellent cosmetic outcome for a patient with large and/or ptotic breasts. For those patients, IBR using TE should be selected only the combination with a reduction mammoplasty of contralateral healthy breast.

Nevertheless, we experienced successful IBR during pregnancy, delivery, and nursing. The healthy breast size was dramatically changed during those periods. The volume of inserted TE was be able to be controlled due to add or gain the inserted normal saline, so we successfully selected an adequate size of SBI. Our report of the detailed operation procedure would be helpful for breast surgeons who might treat BCP-patient.

Table 2 Immediate breast reconstruction with expander in pregnant breast cancer patients

Case	Age, years	Gestational age (week)	pT	pN	ER	HER2	Surgery	SN dissection	Ax dissection	Radiotherapy	Chemotherapy	Timing of chemotherapy	Hormonal therapy	Relapse [months]
1	38	19	3	1	+	–	SSM	Yes	Yes	No	Yes	After delivery	Yes	Distant [39]
2	44	7	1	1	+	–	SSM	Yes	Yes	No	Yes	After delivery	Yes	No
3	30	13	2	2	+	–	Bt	No	Yes	Yes	Yes	After delivery	Yes	Distant [7]
4	34	26	2	0	+	–	Bt	Yes	No	No	No	–	Yes	No
5	39	12	2	1	–	+	Bt	No	Yes	Yes	Yes	After delivery	No	Local [19]
6	36	8	2	0	–	–	Bt	Yes	Yes	No	Yes	During pregnancy	No	No
7	37	24	2	1	–	–	SSM	No	Yes	No	Yes	During pregnancy	No	No
8	31	11	3	3	+	–	Bt	No	Yes	No	Yes	After delivery	Yes	No
9	34	17	1	1	+	–	NSM	Yes	Yes	No	No	–	Yes	No
10	30	24	2	1	–	+	Bt	No	Yes	No	Yes	After delivery	No	No
11	40	26	2	1	+	–	Bt	No	Yes	No	Yes	During pregnancy	Yes	No
12	37	16	tis	0	–	+	Bt	Yes	No	No	No	–	No	No
Present case	39	32	2	0	–	–	SSM	No	Yes	No	Yes	After delivery	No	Local [3]

SN, sentinel lymph node; Ax, axillary lymph node; SSM, skin sparing mastectomy; Bt, total mastectomy; NSM, nipple sparing mastectomy; Distant, distant relapse; Local, local relapse

Conclusions

In this case of a patient diagnosed with BCP, local recurrence occurred after a short disease-free interval following IBR using TE. Oncologically, the needle tract feeding/implantation should be resected at the time of primary operation. The definitive observation of the breast during pregnancy, breast feeding, and after feeding would help for breast surgeons to reach a good symmetrical result.

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Footnote

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient.

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