Immediate reconstruction of the breast with implants and prolene mesh for early breast cancer

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Abstract

Introduction: Several techniques are available today for immediate breast reconstruction after mastectomy for breast cancer in early stage and the choice depends on patient condition, experience and surgeon skills. It is possible to use a definitive implant or a muscle flap to reconstruct breast, this procedure was performed under general anesthesia and immediately following a total mastectomy. While using a tissue expander requires two surgical procedures.

Patients and methods: We study a series of patients with early breast cancer who underwent total mastectomy and immediate breast reconstruction with implants in a submuscular pocket created beneath the pectoralis major muscle and prolene mesh. The study has conducted at the Breast Department – Oncology Center of Cho Ray Hospital from 04/2020 to 04/2021.

Results: There were 25 patients with early breast cancer (Stage 0: 6 cases, Stage IA: 2 cases, Stage IIA: 17 cases), in which, two cases had neoadjuvant therapy. A total of 17 nipple-sparing mastectomy reconstructions and 8 skin-sparing mastectomy reconstructions were performed during the study period. Mean age were 45,4 ± 9,2 years old (from 30 to 63). Mean operation time were 239 ± 26,4 minutes. No major complications were recorded. There is one case with skin redness and one case with partial nipple ischemia, these cases were stable when discharging from the hospital. In cosmetic aspect, results were excellent achieved 20% and good 80% respectivelly. The patients had been follow-up and treated with multi disciplinary specialty consultant after surgery, no case needs adjuvant radiotherapy. No recurrence or distal metastasis was recorded.

Conclusion: Mastectomy and immediate breast reconstruction with implant in early breast cancer is feasible with strict condition. However, further studies with a larger sampling size and a follow-up are necessary to draw more validated conclusions.

Keywords: breast cancer, immediate breast reconstruction.

Introduction

Breast cancer is one of the most common cancers in women and the leading cause of cancer death in women worldwide. Each year in Vietnam, there are more than 15,230 new cases of breast cancer caused more than 6,100 deaths [1]. Today's breast cancer treatment has many changes and advances for improving survival rates and at the same time leading to a better quality of life. Therefore, bringing patients back to normal life and no longer having physical defects is one of the current concerns in surgery for breast cancer treatment.

In Vietnam, in the past, most surgeons applied the total mastectomy technique and axillary lymph node dissection for breast cancer, even for patients with early cancer to achieve safety. However, many studies have proven that conservative surgery, or skin-saving (skin-sparing) mastectomy, nipple-sparing mastectomy still achieves safety and effectiveness if the technique is guaranteed as well as performing extemporaneous biopsies to determine safe surgical margins. In the study of Woosung Lim [4] showed that the results of the disease-free survival time and the 5-year overall survival rate of the group of patients with skin-sparing mastectomy were similar to the group with conventional mastectomy at all stages, and the local recurrence rate between the two groups did not have a statistically significant difference. Eva Singletary [5] applied skin-sparing and immediate reconstruction mastectomy for 545 patients with early breast cancer and concluded that local recurrence after surgery is related to the biological nature of breast cancer and disease stage, but not related to skin-sparing mastectomy or reconstruction.

Therefore, we carried out the study "Evaluating early results of mastectomy with lymphadenectomy and immediate breast reconstruction with breast implants for breast cancer" at the Breast Department – Oncology Center of Cho Ray Hospital aimed to provide the effectiveness and safety of this procedures, as well as evaluate the satisfaction of patients after being treated.

Materials and methodology

Research method

Research method: Case series descriptive prospective.

Time and location: from 04/2020 to 04/2021 at the Breast Department – Oncology Center of Cho Ray Hospital.

Subjects: All breast cancer patients have had mastectomy and immediate breast reconstruction with implants

Selection criteria: All patients were diagnosed with breast cancer stage T2 or less and treated with mastectomy and immediate breast reconstruction with implants.

Exclusion criteria:

Patients with breast malignancies that invade the skin or large pectoral muscles

Patient has a history of previous breast implant surgery

Surgical procedures

Diagnosis: The patient was diagnosed with breast cancer after having histopathological and immunohistochemical confirmations. The patient was then staged, which included assessment of the tumor and regional lymph nodes through clinical examination and bilateral mammogram, assessment of distant metastases through abdominal ultrasonography, frontal chest X-ray, or chest CT scan or PET-CT if necessary.

Multi disciplinary consultation (MDT): Patients with a confirmed diagnosis will be consulted to provide appropriate treatment. Patients with surgical indications in the Oncology consultation will be considered for the appropriate surgical procedures depending on the tumor assessment and stage of the disease. If the patients with T1 or T2 tumor, Tis spread or tumor close to the nipple and have a desire for immediate breast reconstruction, they will be selected for mastectomy and immediate breast reconstruction with a breast implant pocket.

Surgical procedure: Patients were indicated for surgery also fully prepared for preoperative tests. They were measured breast sizes to choose the right breast implant.

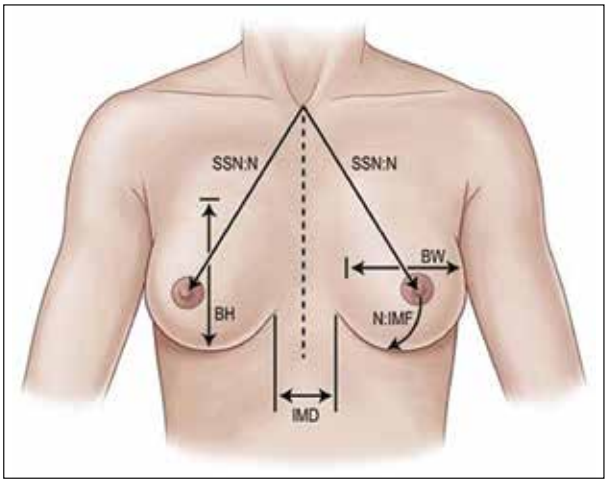

Fig. 1: Dimensions to be measured before surgery include: SSN:N (supra sternal notch to nipple) distance, BW (breast width), BH (breast height), IND (internipple distance) and N:IMF (nipple : inframammary fold)

Dimensions to be measured include: the distance from the supra sternal notch to nipple, the internipple distance, the width of the breast, the line from the nipple to the inframammary fold.

We use Motiva implants without chips for breast reconstruction, so after making the required sizes, we align according to the following sizes to choose the right breast implant.

Surgical procedure:

Mastectomy: The patient was in supine position with a pillow under the shoulder. Concentric Mastopexy (whiteoval)incision in the direction of the tumor, maintaining the nipple or removing if the tumor is close to the nipple or invaded the nipple has been evaluated under previous ultrasound. Perform dissection of the entire mammary gland. An extemporaneous biopsy should be well done to determine the posterior nipple tissue if the nipple is preservative. If the extemporaneous biopsy results show no tumor cells, the nipple was kept. After mastectomy, axillary lymph node dissection of group 1 and group 2 was performed.

Creating the breast pocket: We chose the method of placing the pocket under the muscle, so we started to dissect the underside of the pectoralis major muscle to create the breast pocket. Proceed to place the breast implant and the cavity has been created. We use additional artificial cushioning (prolene mesh) to support the closure of the breast cavity and the implant in order to reduce the tension of the muscle layer, while creating a more natural delay for the breast implant. Place two drainages in the chest and axillary area. Cosmetic wound stitches.

Postoperative monitoring: Monitor for postoperative complications including bleeding, wound infection, or nipple necrosis if the patient maintains the nipple. Also evaluate the pain and chest wall tightness caused by the breast implants.

Re-examination: The patient was discharged after removing both drains and no postoperative complications. Schedule a follow-up after 1 week of discharge and continue post-operative treatment procedures.

Evaluate early results: record complications: infection, skin redness, implant exposure or sclerosis. To assess patient satisfaction, Satsuki Ueda used a 25-questionaires.

Results

Age

The mean age of patients in our research was 45,4 ± 9,1 years old, meanwhile the youngest patient was 30 years old and the oldest was 63 years old.

Breast cancer stages:

Tumor size: The average size by clinical assessment was 2.28 cm, the mean size by ultrasound check was 12.3 x 17 mm. Clinically, there were no lymph nodes or distal metastases.

Table 1: Breast cancer stages (n =25)

	T (n = 25)	%
TisN0M0	4	16%
ycT0N0M0	2	8%
T1N0M0	2	8%
T2N0M0	17	68%

Comment: There are 4 cases of breast cancer in situ with extensive lesions requiring mastectomy. There were 2 cases of neo-adjuvant chemotherapy with good response clinically.

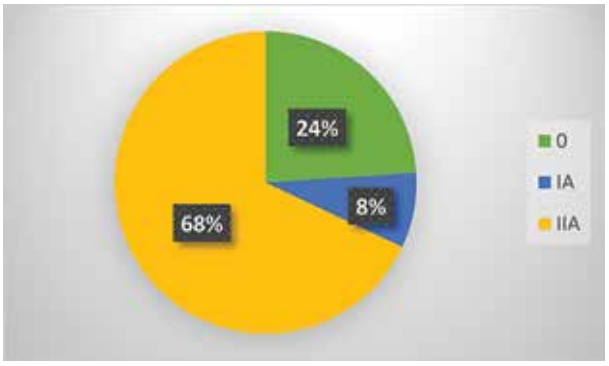

Chart 1: Breast cancer stages according to TMN (n =25)

Comment: Most cases are in stage IIA (68%)

In our series, there were 4 patients with histopathological results confirming carcinoma in situ, so cTis was evaluated, accounting for 16%, there were 2 cases after chemotherapy, no tumor cell was seen on histopathological examination and no tumor at the same time. Tumor images on ultrasound should be evaluated for ycT0 after chemotherapy, accounting for 8%, the rest of the patients are evaluated for T2 (68%), all patients are at stage N0M0 (100%). Therefore, the highest proportion of patients with TMN staging was stage IIA (68%).

Characteristic of surgical procedures

Table 2: Surgical procedures

Descriptions	No. of patient (n = 25)	%
Mastectomy without removal of nipples + implant placement	17	68%
Conventional mastectomy + implant placement	8	32%

There were 17 cases (68%) of mastectomy without nipple dissection and breast implant placement; 8 cases (32%) had conventional mastectomy and breast implant placement.

Intraoperative extemporaneous biopsy were recorded 17 results that nipple tissue did not have tumor cells, one had tumor cells at nipple tissue, in addition, in other cases, the indication to remove the nipple was from the beginning.

Mean surgical duration was 239 ± 26,4 min

All cases used Motiva breast implants without chips, there were 22 cases accounting for 88% using a prolene mesh and 3 (12%) cases of no need for artificial stomal tissue.

Table 3: Patients pocket size (n =25)

Pocket size (cc)	No. of patient (n = 25)	%
185	1	4%
205	1	4%
230	1	4%
245	1	4%
255	5	20%
265	4	16%
285	10	40%
300	2	8%

Comment: The pocket size was mainly in the range of 255 - 285cc, the most pockets with a volume of 285cc accounted for 40%, there are only 4 cases of using pockets smaller than 255cc including 185cc, 205cc pockets, 230cc and 245cc and 2 cases using large 300cc pockets.

During the operation, we recorded only one case with a complication of pectoralis major muscle tear when placing the implant, accounting for 4%, in addition, no other complications were recorded.

Postoperative evaluation

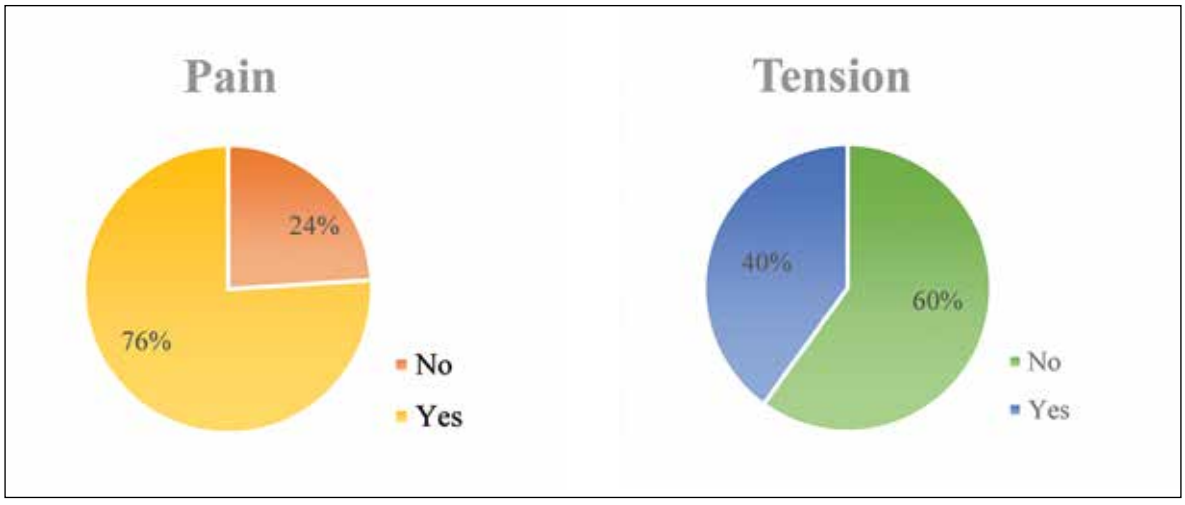

Chart 2: Evaluation of postoperative pain and tension

The rate of postoperative pain was 76% and postoperative tension was 49%.

The mean time of chest drainage removal was 4,4 ± 1,1 days and the mean time of axillary drainage removal was 7,9 ± 2,2 days.

The mean postoperative length stay was 9,6 2,5 days and mean hospitalization was 14 ± 3,1 days.

Surgery early outcome

Table 4: Patients satisfaction postoperative

Patients' satisfaction postoperative	No. of patients (n =25)	%
Not satisfied	0	0%
Satisfied	20	80%
Really satisfied	5	20%

After surgery, 80% of patients are satisfied with breast reconstruction and 20% of patients are very satisfied with breast implant reconstruction. We have not recorded any cases where the patient was dissatisfied or required to have the breast implant removed. In addition, there were no cases with complications of implant rupture or contracture leading to remove.

Discussion

Choosing the stage of breast cancer can have immediate breast reconstruction surgery with breast implants

Skin-sparing mastectomy (SSM) was first described by Toth and Lappert in 1991 [2]. The definition describes a modified mastectomy, simple or radical, with minimal skin removal. Surgical skin removal must: (1) include the nipple-areola complex, (2) include the biopsy site, and (3) allow access to the axilla to enable dissection [2]. The oncological safety of skin-sparing and immediate-reconstructive (IR) mastectomy for early breast cancer has been demonstrated in several studies. However, this surgery is considered to be a relative contraindication for locally advanced breast cancer (defined as T3N0 or stage III) due to the risk of local recurrence (LR), delay in adjuvant therapy. and the cosmetic effects of adjuvant radiotherapy to the reconstructed breast [1].

According to Woosung Lim, skin-sparing mastectomy and immediate reconstruction have

been shown to be a cancer-safe procedure in several studies of early breast cancer. In the study by Toth et al., a retrospective analysis of 50 patients undergoing this surgery reported no local recurrence after 57 months of follow-up, of which 48% were stage 0. Foster et al. analyzed 25 patients with stage IIB or III surgery and reported that only one (4%) of patients had a local recurrence that occurred after 49.2 months of follow-up. The oncological safety of immediate skin-sparing and regenerative mastectomy for T1 and T2 tumors has been demonstrated in several studies. In the study of Newman et al., 372 surgeries were performed for patients with T1 and T2 breast cancer with a local recurrence rate of 6.2% after 26 months of follow-up. Kroll et al also noted that in 114 patients with T1 or T2 who underwent surgery, a local recurrence rate of 7.5% was reported after 6 years or more of follow-up. Similarly, Drucker-Zeruche and Robles-Vidal reported that only one case of local recurrence occurred in 105 surgical patients at 51 months of follow-up [3].

Few studies have reported on skin-sparing and regenerative mastectomy for locally advanced breast cancer (defined as T3N0 or stage III) and T3 tumors. Some authors such as Foster et al. reported on 25 patients and Downes reported on 34 out of 38 patients with stage IIB including 8 patients with T3 found that mastectomy saves skin for locally advanced breast cancer is carcinogenic, but the data are too small for this group of patients. In Woosung Lim's study, the author suggested that patients with locally advanced breast cancer and T3 tumors received conventional mastectomy and immediate breast reconstruction because of the evidence on the safety of secretory mastectomy. Skin savings for these patients are less obvious [4].

In our series, all patients were at stage IIA or below, there was one patient in stage IIB before chemotherapy, however, the tumor was T2N1, before surgery we re-evaluated and the tumor was in stage IIA. Thus, all of our patients are at stage < T2. We found that, for this stage, the tumor is relatively small so that saving skin incision is easier and if the tumor is initially located far from the nipple, the rate of nipple infiltration is also lower. Therefore, this is a suitable group of patients to perform skin-sparing surgery and immediate reconstruction by implant.

Difficulties in mastectomy and immediate breast reconstruction with breast implants

We noted some technical difficulties when performing skin-sparing mastectomy and immediate breast reconstruction with breast implants. In the mastoid phase, for patients with saving skin incision, the incision is smaller with the goal of removing the tumor but still ensuring a safe surgical margin, but this will make it difficult to remove the whole breast. With deep angles, breast tissue may be missed. Or surgeons have difficulty assessing how much breast tissue dissection is adequate because the breast tissue is located deep on the non-incisional side and is difficult to access. At this time, the role of the woman's exposed skin is very important to assist the primary surgeon in dissecting to the correct limit of breast tissue, and without damage of skin. In order to accurately determine the surgical margin, we have performed the extemporaneous biopsies of the skin margins to determine the safe surgical margin. With the internal breast tissue, in order to ensure the good dissection of tissue, in the first cases, we performed the histopathological check of breast tissue samples to determine whether the cut tissue is breast tissue or fatty tissue. When the histopathological results are available, we can determine that the surgical specimen margin is sufficient and then determine the appropriate dissection for removal of breast tissue [5].

For implant placement phase, the most technical difficulty is that the cavity created was not big enough to accommodate the implant. Or, after the breast implant has been inserted, the cavity is too tight, leading to difficult suturing the cavity, possibly tearing the pectoralis major muscle cavity, and after surgery, the patient's chest is hard and there is no natural appearance. Therefore, to create more volume for the cavity, we use artificial tissue

to create the shape after inserting the breast implant into the cavity. The bio-artificial material used in these cases is ADM (Acellular Dermal Matrices), which is a material made from human epidermal cells through a process of completely removing the cells and retaining only the background structure. However, this type of material is expensive, so we used an alternative material that is more affordable for cancer patients. We have two types of materials used, vascular patch and prolene mesh. The type of material is selected according to what is available at the time of surgery. With the support of artificial stromal tissue, we noted a reduction in the tension when closing the cavity, reducing the risk of tearing the pectoralis major muscle cavity and creating a natural appearance for patient immediately after surgery.

We recorded one patient due to the pectoralis major muscle being too thin, after implantation, the pectoralis major muscle cavity was completely torn. To manage, we reconstructed the patient's breast cavity with the prolene mesh sutured to the remaining pectoralis major muscles.

Thus, we noted two main difficulties in surgery: difficulty in dissection and excision of the entire breast tissue due to the skin-sparing incision and the complication of tearing the breast implant pocket when placing.

Early results of mastectomy with immediate breast reconstruction by breast implants

Surgical complications

Skin-sparing mastectomy with retaining the nipple to improve the aesthetic results and bring better psychology to patients after surgery. However, there is a risk of necrosis of the nipple that affects the final cosmetic result. The rate of this complication varies from 0-16% [4]. So far, the problem has been to choose the incision, the area of ##skin flap removal, the method of tissue dissection under the areola area to reduce the necrosis as much as possible, and at the same time consider the risk of local recurrence. According to Stolier, there are recommendations on surgical techniques. First, the incision is reasonable. Second, gently dissect the posterior areola tissue and do the hemostasis carefully with bipolar cauterization. Third, do not dissect the breast skin flap too far from the limits, causing damage to the blood vessels supplying the breast skin flap. The rate of nipple necrosis complications in the study of Tran Van Thiep was 4.6%. In our study, there was one case, accounting for 4% complicated areola necrosis.

In addition, we did not have other complications such as postoperative seroma of skin, bleeding or rupture of the pocket. Except the case of necrosis of areola, we also did not record wound infection complications. After surgery, we used antibiotics for 5-7 days for all patients in our series.

Patients satisfaction.

To assess patient satisfaction, Satsuki Ueda [6] used a 25- questionnaire survey on 71 patients with skin-sparing mastectomy and immediate-reconstruction, 158 patients with total mastectomy, and 154 patients with conservative mastectomy. The percentage of patients responding to survey was 70%, 77% and 81%, respectively. The results of study showed that skin-sparing mastectomy and immediate-reconstruction had a low local recurrence rate and was similar to that of conservative surgery and total mastectomy. However, this surgery resulted in a better cosmetic outcome and the patient satisfaction was similar to that of the conservative surgery group and this physical satisfaction was higher than with total mastectomy.

In our study, 80% of patients were satisfied with the surgical results and 20% of patients were very satisfied with this result. We assessed patient satisfaction based on the daily post-operative visit and asked the patient's assessment of the reconstructed breast prior to discharge. The group of patients who were very satisfied with the results of surgery said that they felt very satisfied with the reconstructed breast, assessed that the breast looked natural and did not feel tight or painful after surgery. The group of patients who were satisfied with the results of surgery said that they were satisfied with

the reconstruction results but felt uncomfortable because there was still little pain and tension after surgery. Because our study only aimed to evaluate the early results of surgery, we only recorded the opinions of patients at the time of postoperative hospital stay and consulted patients before they discharge. However, we also noted that no patient had to undergo surgery again later because of complications of pocket constriction or infection, or the patient did not want to have the breast implant removed. With these results, we believe that mastectomy and immediate reconstruction with breast implants really bring satisfaction to the patient. Breast reconstruction after removal of breast due to cancer brings optimism, aesthetic confidence to patients, helps patients overcome disease complexes, improves quality of life and easily reintegrates. social life when returning home.

Conclusion

Skin- sparing mastectomy and immediate breast reconstruction with breast implants for breast cancer that have been shown to be safe and effective. Choosing the right patient with tumor at early stage leads to better surgical and post-operative cosmetic results, helping the patient avoid the total mastectomy leading to body defects postoperatively and impacted to psychological patient. The use of Prolene Mesh to cover the pocket helps to create a larger pocket and creates a natural appearance of the breast after reconstruction. Post-operative results show that most of the patients are satisfied with the reconstructed breasts, although the breast tissue is not as perfect and natural as the original, but good psychological effects are achieved in almost all patients, helping them to return their normal a life as possible and improve the quality of life after treatment for cancers.

Conflict of interest: The authors declare that they have no conflict of interest.

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