

Mastoscopic skin sparing mastectomy and sentinel lymph node biopsy combined with immediate mammary prosthesis reconstruction for early central breast cancer



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OBJECTIVE: *This study aims to evaluate efficacy and safety of mastoscopic skin sparing mastectomy and sentinel lymph node biopsy combined with immediate mammary prosthesis reconstruction for early central breast cancer.*

MATERIALS AND METHODS: *The medical records of patients, who underwent mastoscopic skin sparing mastectomy and sentinel lymph node biopsy combined with immediate mammary prosthesis reconstruction during the period of March 2011 and November 2016, were collected from Fuxing Hospital. Data on clinicopathologic characteristics, operative time, the number of resected sentinel lymph nodes, and complications were analyzed.*

RESULTS: *The procedures were performed in 11 patients with central breast cancer. Among these patients, 10 patients were diagnosed with infiltrating ductal carcinoma, while the remaining patient had Paget's disease with infiltrating ductal carcinoma. The mean operation time was 148.2 minutes with minimal bleeding, and the median number of sentinel lymph nodes dissected from each operation was 4.6. The volume range of implants was 180-245 cc. There were no recurrences and upper limb swelling during the follow-up period. Merely two cases had sporadic axillary pain due to the mastoscopic lymph node dissection performed for the positive sentinel lymph nodes. All patients were satisfied with the reconstructive appearance.*

CONCLUSION: *The present study shows that mastoscopic skin sparing mastectomy and sentinel lymph node biopsy combined with immediate mammary prosthesis reconstruction is a feasible procedure for early central breast cancer.*

KEY WORDS: Breast cancer, Fat suction, Reconstructive surgery, Sentinel lymph node, Skin sparing mastectomy

Introduction

Patients with centrally located breast tumors account for 5-20% of breast cancer cases¹. Central breast cancer tumors proximal to the nipple-areola complex (NAC), which involves the subareolar tissue, and the ducts in

the nipple are more frequent, when compared to peripheral tumors. Traditionally mastectomy is still indicated for these patients. It is difficult to achieve good aesthetic results through central quadrantectomy for breast conservation^{2,3}. Other oncologic procedures, such as the latissimus dorsi (LD) myocutaneous flap, and Grisotti flap would have conspicuous scars^{4,5}.

Skin-sparing mastectomy (SSM) followed by immediate breast reconstruction (IBR) was first reported by Toth and Lappert in 1991⁶. This approach has been acknowledged to achieve radical cure and good cosmetic results. However, the scar was sometimes obvious.

Sentinel lymph node biopsy (SLNB) has been widely used for patients presenting with negative clinical nodes, instead of axillary lymph node dissection (ALND)⁷.

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The endoscopic technique is already widely used in many surgical fields. Endoscopy-assisted breast surgery is performed through minimal incisions, and is presently used to perform SSM, followed by IBR with prosthesis^{8,9}. Mastoscopic sentinel lymph node biopsy has a good identification rate (IR) and low false negative rate (FNR). It can enhance the aesthetic result, and reduce postoperative complications^{10,11}.

The aim of the present study was to share our experience of mastoscopic SSM and SLNB combined with immediate mammary prosthesis reconstruction for early central breast cancer, evaluate this technique, and discuss the results of 11 cases in our hospital since 2011.

Patients and Methods

PATIENTS

A total of 11 female patients with cN0 central breast cancer underwent the mastoscopic SSM and SLNB combined with immediate mammary prosthesis reconstruction between March 2011 and November 2016 at Fuxing Hospital in Beijing (China). These patients were all diagnosed with invasive ductal carcinoma by core needle biopsy. The primary lesion sizes were <5 cm, and the distance between the nipple and lesion was <2 cm. All patients were at stage I or II, and the axillary lymph nodes were negative by ultrasound examination. Patients with severe breast ptosis and the involvement of the skin or muscle were excluded (Table I).

The age of these patients ranged within 26-42 years old, with an average of 36.2 years old. These patients were not given neoadjuvant therapy before the operation. This study was approved by the Ethics Committee of Fuxing Hospital of Capital Medical University. All patients pro-

vided a signed informed consent before surgery, and all surgeries were performed by one surgeon (BY.L).

The cosmetic results, intra-operative blood loss, operative time, lymph node harvested, drainage flow and upper extremity function were documented.

Operation was performed in the supine position with the ipsilateral arm abducted to 90° and hung to the frame over the head. Then, 1 ml of blue dye was injected near the areola at five minutes before the surgery. After blue dye injection, 300-400 ml of lipolysis solution was injected into the axillary fat pad. This solution comprised of 250 ml of 0.9% saline, 250 ml of distilled water, 800 mg of lidocaine, and 0.5-1.0 mg of adrenalin. After 15 minutes, negative pressure liposuction was performed through a 10-mm hole between the middle line of the axilla and outer edge of the breast. A Karman ch.8 nozzle was inserted into the hole, and liposuction was initiated at a suction pressure of 0.8 Bar for 10-15 minutes. A 10-mm trocar was placed in the liposuction hole. CO₂ air was insufflated into the axilla with successive 8-10 mmHg of pressure. The working space of the axilla was set up, and a 30° mastoscope (Rudolf Co., Germany) was inserted into the 10-mm trocar. Additional two 5-mm trocars were placed in the anterior and posterior axillary line (Fig. 1).

Diathermy scissors and grasping forceps were inserted through the 5-mm trocars to dissect the blue dyed SLNs (Fig. 2). The SLNs were removed through the 10-mm incision using sponge forceps. The liposuction fluid was filtered to retrieve the blue dyed nodes. The blue dyed nodes were intraoperatively evaluated by fast frozen sections, while unstained lymph nodes were histologically examined. Mastoscopic axillary lymph node dissection was performed when SLN was diagnosed with metastasis.

An elliptical excision was made around the mammary equator for 3-4 cm, including the nipple. The subcuta-

TABLE I - Patient clinical data

Clinical data	Grouping	Cases
Tumour size	0-2cm	3
	2-5cm	8
	>5cm	0
TNM staging	1	3
	2	8
	3	0
	4	0
Estrogen receptor	(+)	8
	(-)	3
Progesterone receptor	(+)	7
	(-)	4
Her2	(+)	3
	(-)	8
Rate of proliferation	20%	7
	20%	4

Her2= human epidermal growth factor receptor. Her2 status was evaluated by immunohistochemistry or in situ hybridization (IHC or Fish).



Fig. 1: Mastoscope was inserted into the 10-mm trocar. Additional two 5-mm trocars were placed in the anterior and posterior axillary line.

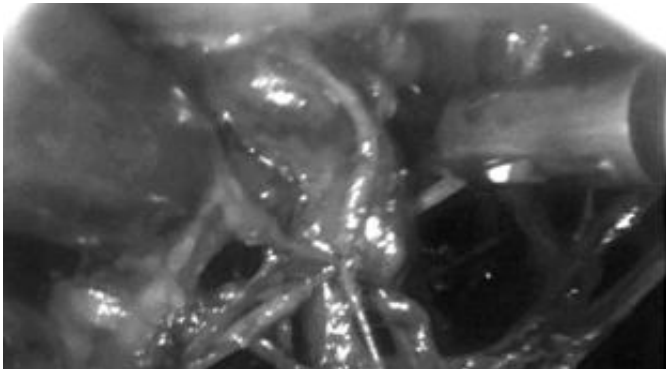


Fig. 2: The blue stained sentinel node was identified and dissected through the diathermy scissors and grasping forceps under the mastoscopic vision.



Fig. 3: The attachment of pectoralis major to the chest was dissected to the level 2-cm under the inframammary fold by the electrocautery under endoscopic vision.

neous working space was set up *via* an electric knife under direct vision. A retractor was used to lift up the skin flap, and the remaining tissue between the skin and breast gland was separated *via* the electric knife under endoscopic vision. The scope of separation had the same width as a normal mastectomy. Then, the breast gland was dissected off the pectoralis major, and pulled out through the incision. The bordering skin was intraoperatively analyzed by fast frozen sections. The axilla and subcutaneous space were washed by warm distilled-water. The lateral border of the pectoralis major was found, and the muscle was lifted up using a retractor through the same incision. The subpectoral pocket was created by electrocautery under endoscopic vision. The attachment of the pectoralis major to the chest was dissected to a level 2 cm under the inframammary fold (Fig. 3). The mentor style implant was inserted into the pocket, and the acellular dermal matrix was used to cover the implant.

Three continuous drainage tubes were left in the axilla, subpectoral pocket and subcutaneous space. Lastly, the chest and supportive dressing were bandaged to prevent

the implant from moving up. Each suction tube was removed when <15 ml of drainage was produced per day.

Results

Mastoscopic SSM and SLNB combined with immediate mammary prosthesis reconstruction was performed in 11 women with early central breast cancer. The mean age of these patients was 36.2 years old (range: 26-42 years old), and their mean weight was 59 kg (range: 51-70 kg). Histology revealed 10 infiltrating ductal carcinomas (90.9%) and one Paget's disease with infiltrating ductal carcinoma (9.1%). The distance between the nipple and lesion was <2 cm. The other clinical characteristics of these patients are shown on Table I.

The operation time was between 131-176 minutes, with an average of 148.2 minutes. With the accumulation of experience of the investigators, the operative time for the last three cases was obviously shortened. The average intraoperative blood loss was 45 ml.

The number of sentinel lymph nodes removed from each case was between 3-7, with an average of 4.6. In two cases, SLNB was followed by mastoscopic axillary lymph

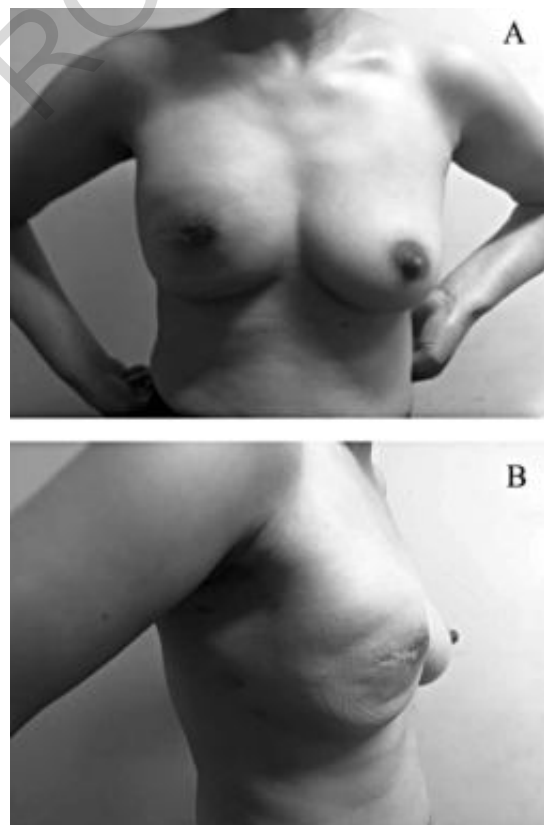


Fig. 4: Patient with central breast cancer was photographed at 1 year after the mastoscopic skin sparing mastectomy and sentinel lymph node biopsy combined with immediate mammary prosthesis reconstruction.

node dissection due to metastasis (one case has metastasis in one node, while the other case had metastases in two nodes). All the margins of breast specimens were clear. There were no major intraoperative complications, such as bleeding of the axillary vein. The intercostobrachial nerve was preserved in all 11 cases. No case turned to conventional sentinel lymph node dissection due to unclear operative view or uncontrolled bleeding. The volume range of implants was 180-245 cc.

The drain was removed at post-operative 5-12 days. The total drainage volume in each case was 80-280 ml. The hospital stay was 7-14 days (mean: 9.6 days). Post-operative chemotherapy and endocrinotherapy were given in the usual manner.

All results were evaluated on November 2017. The follow-up time after the operation was from 12-22 months, with an average of 15.6 months. The mobility of the shoulder in all patients was not affected. Merely two cases had sporadic axillary pain due to the mastoscopic lymph node dissection performed for the positive sentinel lymph nodes. No tumor relapse and swollen upper limb occurred during the follow-up period. All patients were satisfied with the reconstructive appearance (Fig. 4).

Discussion

At present, breast-conserving surgery (BCS) has become the main alternative for treating breast cancer, and the tumor involvement of the NAC for central breast cancer is 2-21%¹². In some cases, an *in situ* component is disseminated to the nipple through the lactiferous duct. Hence, this patient group is usually excluded from conservative treatment due to the uncertainty of oncological control and aesthetic deterioration. Although some oncoplastic techniques improve the aesthetic result and preserve the breast, these procedures are sporadic and based on personal experience. Furthermore, each patient needs extensive and complicated remodeling. Therefore, their methodology and description are difficult¹³⁻¹⁵.

For some educational reasons, breast conserving therapy has not been accepted by most Chinese women even with early breast cancer. The size of a Chinese patient's breast is smaller, when compared to that in Western countries. Hence, the outlook of BCS is not very satisfactory. Some Chinese patients do not accept radiotherapy. Hence, mastectomy remains as the main stream in China¹⁶. However, mastectomy tends to make patients suffer from anxiety and depression after the operation. On the other hand, the absence of freckles and scars is preferred in China. Therefore, minimally invasive incision was not only a medical requirement, but also a cultural need. The gap between mastectomy and BCS should be filled through the modern approach.

NSM or nipple coring with immediate implant reconstruction carries the risk of necrosis^{17,18}. The tumors of central breast cancer are proximal to NAC. Hence, the

involvement of NAC is more frequent than peripheral tumors. The necrosis of NAC affects implant reconstruction. Hence, the resection of NAC is safe for central breast cancer. Toth and Lappert developed SSM, which preserves most of the skin of the breast, except for NAC, and this technique facilitates breast reconstruction with oncological safety¹⁹. The present technique enables the procedure of SSM and implant reconstruction through the same small incision. Patients with early central breast cancer after SSM also avoid the need for radiotherapy.

Endoscopic surgery has impacted all surgical fields, and is considered as one of the major advances in therapeutic methods of surgery in the past 20 century. Mastoscopic technique applied on breasts may improve functional and cosmetic aspects with great potential benefits for patient²⁰. It provides an excellent view of anatomic structures. Hence, these can be preserved well and precisely stop the bleeding.

SLNB with mastoscopy is based on lipoaspiration, making the procedure simpler. Merely three small holes are needed in the axilla for operation. Hence, the blood vessels and nerves can be identified and preserved very well through the magnifying function of mastoscopy. It has been reported by previous literatures that axillary liposuction is safe, because it does not alter the pathologic features of lymph nodes^{11,21}.

Due to the accumulated experience of mastoscopic axillary lymph node dissection (MALND) and familiarity with the axillary anatomy under the endoscopic view, the investigators have crossed the learning curve. Hence, mastoscopic sentinel lymph node dissection could be performed within 30 minutes.

The intercostobrachial nerves can be clearly seen under a mastoscope. Hence, these can be protected well, diminishing the sensory disturbance of the arm.

Furthermore, MALND can be performed through the same three small holes, when the sentinel lymph nodes are positive. Moreover, the drainage can also be drawn from the same holes. Hence, this method can avoid the enlargement or addition of incisions.

In the present cases, a sufficient submuscular space was created using the endoscopic technique through the small incision, and the acellular dermal matrix was sutured to cover the implant.

There were no severe pain, edema of the upper limb, or restriction of arm mobility. Merely two cases had sporadic axillary pain, because they underwent successive MALND. Furthermore, there was no case of tumor recurrence. This result indicates that the operation is safe and effective.

Immediate mammary prosthesis reconstruction has become a standard function for breast augmentation. Breast reconstruction can help patients possess self confidence and cope well with life. Furthermore, this method avoids the additional injury of autologous flaps and secondary breast reconstruction. Moreover, the aver-

age breast volume of Chinese women is small. Hence, this kind of surgery would be well accepted by these patients.

Scopic surgery for breast cancer has been recently performed. Although it may be challenged as a new technique, it has already become an alternative approach for treating breast cancer. The present study has limitations. The follow up time was short and the number of patients was small. Hence, the mastoscopic group could not be compared with the conventional surgery group. However, various literatures have reported the advantages of mastoscopy, and reported that mastoscopy could achieve the equivalent oncological results as conventional surgery^{10,20,22}.

In conclusion, mastoscopic skin sparing mastectomy and SLNB combined immediate mammary prosthesis reconstruction may achieve minimal invasion, function preservation, and cosmetic appearance. The investigators consider that this should be the preferred approach for treating early central breast cancer.

Riassunto

Questo studio è finalizzato a valutare l'efficacia e la sicurezza della mastectomia mastoscopica risparmiante della pelle e della biopsia del linfonodo sentinella combinata con la ricostruzione protesica mammaria immediata per il carcinoma mammario centrale in fase iniziale. Sono state raccolte le cartelle cliniche delle pazienti sottoposte a mastectomia mastoscopica, con risparmio della pelle e biopsia del linfonodo sentinella combinate con la ricostruzione immediata della protesi mammaria, presso il Fuxing Hospital durante il periodo marzo 2011 novembre 2016. Sono stati analizzati i dati sulle caratteristiche clinico-patologiche, i tempi dell'intervento, il numero di linfonodi sentinella resecati e le complicanze. La procedura è stata eseguita in 11 pazienti con carcinoma mammario centrale. Tra queste pazienti, in 10 è stata diagnosticato un carcinoma duttale infiltrante, mentre l'altra paziente aveva la malattia di Paget con carcinoma duttale infiltrante. Il tempo medio di operazione è stato di 148,2 minuti con sanguinamento minimo e il numero mediano di linfonodi sentinella sezionati da ciascuna operazione è stato di 4.6. La gamma di volume degli impianti era di 180-245 cc. Non ci sono state recidive e gonfiore degli arti superiori durante il periodo di follow-up. Solo due casi hanno presentato dolore ascellare sporadico dovuto alla dissezione mastoscopica eseguita per i linfonodi sentinella positivi. Tutte le pazienti si sono dichiarate soddisfatte dell'aspetto ricostruttivo.

Questo studio mostra che la mastectomia mastoscopica con risparmio della pelle e la biopsia del linfonodo sentinella combinate con la ricostruzione immediata della protesi mammaria, è una procedura praticabile per il carcinoma mammario centrale in fase iniziale.

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