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Research Article

A Retrospective Study of the Dual-Main Surgeons' Endoscopy-Assisted Insufflation Bilateral Nipple-Sparing Mastectomy with Immediate Implant Reconstruction

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ABSTRACT

Background: Endoscopy-assisted breast surgery (EABS) is widely accepted, especially for young breast cancer women. But single-main surgeon's EABS (SMS-EABS) has a long operation time and lots of blood loss during the surgery. Therefore, we advocate applying dual-main surgeons' EABS (DMS-EABS) to improve surgical technique. **Materials and Methods:** This retrospective cohort study analyzed 34 patients with endoscopy-assisted insufflation bilateral nipple-sparing mastectomy with immediate implant reconstruction from March 2021 to December 2023 in The Sixth Affiliated Hospital of Sun Yat-sen University medical database and compared the blood loss, operation time, post-operation hospital stay, implant volume, operation costs, operation complications and breast-Q questionnaire between SMS-EABS and DMS-EABS with statistical analysis. **Results:** The blood loss (29.38 ml vs 51.67 ml, $p<0.05$) and operation time (4.38 h vs 5.56 h, $p=0.01$) in the DMS-EABS group are significantly better than SMS-EABS. There is no statistical difference in post-operation hospital stay, implant volume, operation costs, operation complications, and aesthetic evaluation between the two groups. **Conclusion:** DMS-EABS has the advantage of reducing blood loss and operation time and it also keeps its aesthetic advantages as same as SMS-EABS. Therefore, it can be widely applied.

1. Introduction

In 2021, breast cancer surpassed lung cancer and became the first cancer in the world [1, 2]. Surgery, as the main treatment for breast cancer, was changed from modified radical mastectomy to breast-conserving surgery (BCS) or EABS [3-5], because more and more young patients are diagnosed with breast disease by advanced screening and adjuvant techniques and have long survival expectation. Therefore, doctors pay attention to the aesthetic results and quality of life, and minimally invasive EABS has become the current trend. With inconspicuous incisions, magnified view, and clear vision, EABS is widely used for benign and malignant breast disease treatment [6, 7]. Endoscopy-assisted BCS [6] and endoscopy-assisted nipple-sparing mastectomy (NSM) or skin-sparing mastectomy (SSM) with immediate implant reconstruction (IIR) [3, 8] are popular breast cancer surgery.

However, EABS has the problem of the long operation time, especially when bilateral breast resection with immediate reconstruction. Therefore, we come up with DMS-EABS, which resects bilateral breasts simultaneously by two main surgeons, significantly reducing the operation time. The dual-main surgeons' model hasn't been applied for EABS previously but is widely used in transanal total mesorectal resection (taTME), confirmed with a decreased operation time and blood loss in radical resection of rectal cancer [9]. Here we introduce our operation skills of endoscopy-assisted insufflation bilateral NSM with IIR and compare the difference between the DMS-EABS and SMS-EABS.

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2. Materials and Methods

2.1. Patients and Surgeons

We searched The Sixth Affiliated Hospital of Sun Yat-sen University medical database for patients who had undergone endoscopy-assisted insufflation bilateral NSM with IIR from March 2021 to December 2023 and collected 34 patients' data. The patients who are satisfied with the following indications were collected: i) Tumor size < 5 cm with radiotherapy contraindications. ii) The distance from tumor to nipple > 2 cm. iii) None to mild breast ptosis women. iv) Small to moderate-sized breasts (C cup size and below). v) Patients with multifocal/multicentric breast tumor. vi) Patients who are difficult to be operated BCS (resection volume over 30%). The contraindications are: i) Paget's disease patients, ii) severe ptosis breasts, iii) tumor invaded skin or chest wall, iv) tumor that was suspicious for nipple and areola or pectoralis muscle involvement as assessed by physical examination or radiological studies. All surgeries in this study were operated by Doctor Haiyan Li and Doctor Zongyan Li, who have individually performed at least 10 single-port insufflation NSM and 30 EABS procedures and were assisted by the same nurse team with extensive EABS experience. All patients' breast-Q questionnaires which reflect their satisfaction with their reconstructed breasts preoperatively and one month postoperatively were collected. This study was approved by the Ethics Committee of the Sixth Affiliated Hospital of Sun Yat-sen University (No.2023ZSLYEC-068).

2.2. Measuring and Marking

To make preoperative marking, patients take a standing position and face the doctor, with hands naturally drooping. The president surgeon labels the patient's height and weight and draws the incision and surgical margin. Firstly, mark the anterior median line. Then, draw vertical lines which are 1 cm lateral to the parasternal lines. Thirdly, identify the anterior axillary lines as the lateral border of the breasts. Fourthly, draw the inframammary fold and the pectoralis major division line (1.5 cm inferior to the inframammary fold). Finally, measure the width and the convexity of the breasts (Figure 1).

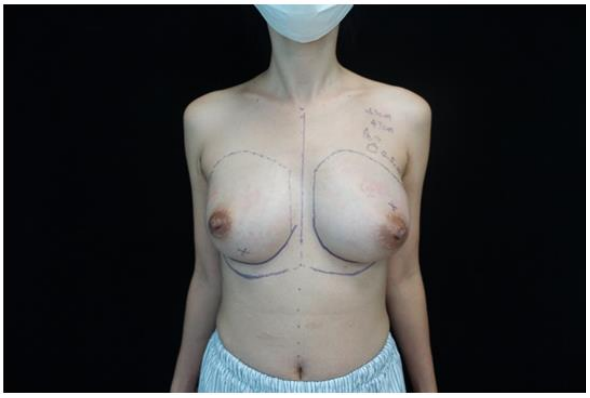

FIGURE 1: Preoperative marking picture.

2.3. Positioning and Preparation

Cefuroxime 1.5g was given 30 minutes before the surgery. For DMS-EABS, two sets of endoscopic equipment were placed as the figure showing (Figure 2). The patients were placed in the supine position and the arm of the operation side was abducted to 90° for the sentinel lymph node biopsy (SLNB) or axillary lymph node dissection (ALND). However, the chest wall, the upper half abdomen, and the arm of the operation side were prepared and wrapped under standard sterile management. When starting the endoscopic part, the arm of the operation side was left to the forehead to relax the pectoralis major and get a good endoscopic vision. A 10 mm in diameter oblique-ended ridged stotz endoscope with a viewing angle of 30° was prepared.

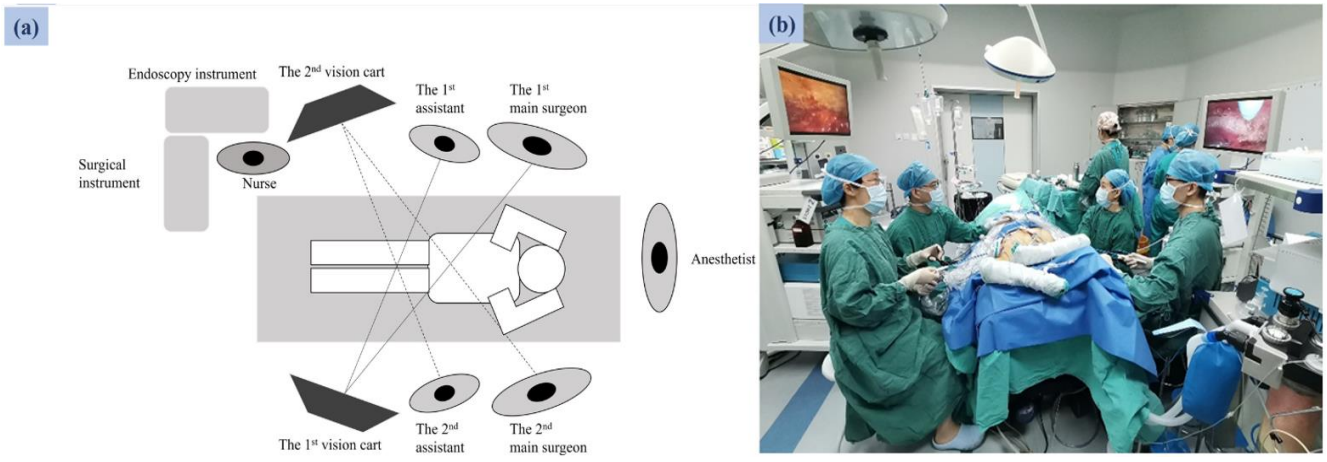

FIGURE 2: The place of equipment in DMS-EABS. **a)** Schematic diagram, **b)** intraoperative photos.

2.4. Axillary Incision

For malignant patients, kanalin was injected around the areola and superolateral quadrant first to identify the sentinel lymph node and then kneaded for 5 minutes followed by waiting 5 mins. According to the preoperative marking line, methylene blue was injected at important points and borders so that the borders could be identified under the endoscopic view. A 4-5 cm inconspicuous "S" shape axillary incision was made and SLNB was operated first. Keep the distance between the incision and the pectoralis major lateral border more than 1 cm and can extend the incision depending on the situation. Once the intraoperative SLNB was confirmed metastasis, ALND was operated on. SLNB and ALND were performed under direct vision. There is no difference between SMS-EABS and DMS-EABS in this part.

2.5. Endoscopy-Assisted Breast Surgery

The pectoralis major lateral border was identified under direct vision through the axillary incision. The space between the pectoralis major and pectoralis minor was divided for 2-3 cm by electrocautery first to make a place for the disposable single-incision laparoscopic surgery trocar (Surgaid Medical, STARPORT) with one superior 12 mm channel for insufflation, one inferior 10 mm channel for endoscope and two 5 mm channels for operation (Figure 3). Then, adequate working space was created by insufflating CO_2 at a rate of 40 L/min, and the CO_2 cavity pressure was maintained at 8 mmHg (1 mmHg= 0.133 kPa). We dissect the breasts in the "submuscular- retromammary-subcutaneous" order which is named the "reverse method" (Figure 4) [8, 10]. The subpectoral muscular pocket was made by dissecting the space between pectoralis major and pectoralis minor from lateral to medial with an electric hook and ultrasonic knife. The superior border of the muscle pocket was about the third rib which was identified as one rib above the rib corresponding to the nipple. The medial border was 1 cm lateral of the parasternal lines. The lateral border was the anterior axillary line, and the inferior border was 1.5 cm inferior to the inframammary fold. All those border lines were marked previously and labeled by methylene blue. An ultrasonic knife was used to dissociate pectoralis major to avoid bleeding from vessels in the muscle bundle, especially the medial border.

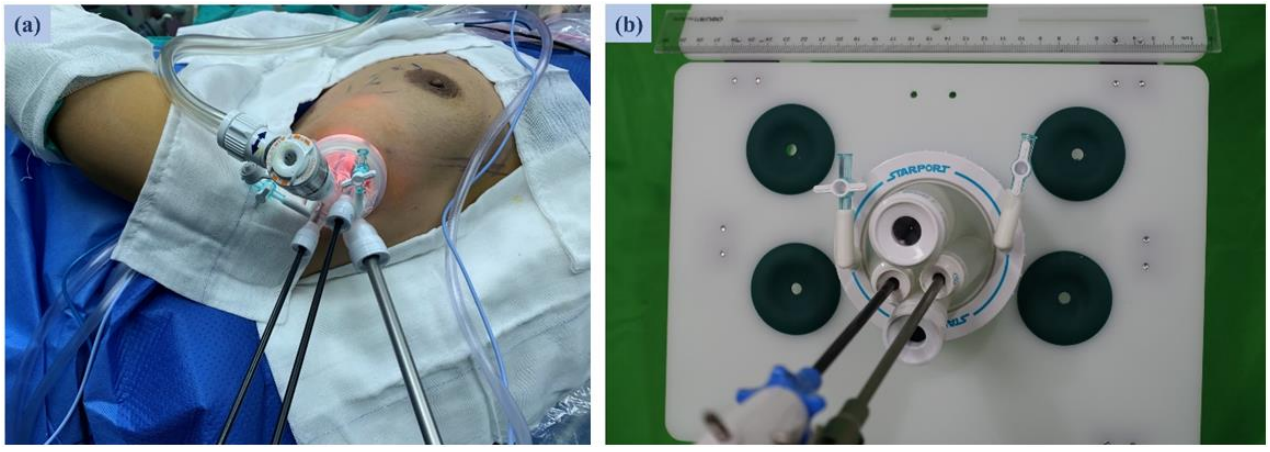

FIGURE 3: The position of the disposable single-incision laparoscopic surgery trocar. The upper 12 mm channel connects with an insufflation tube. **a)** The placement of the trocar in the operation. **b)** The trocar simulator shows a similar condition as in operation.

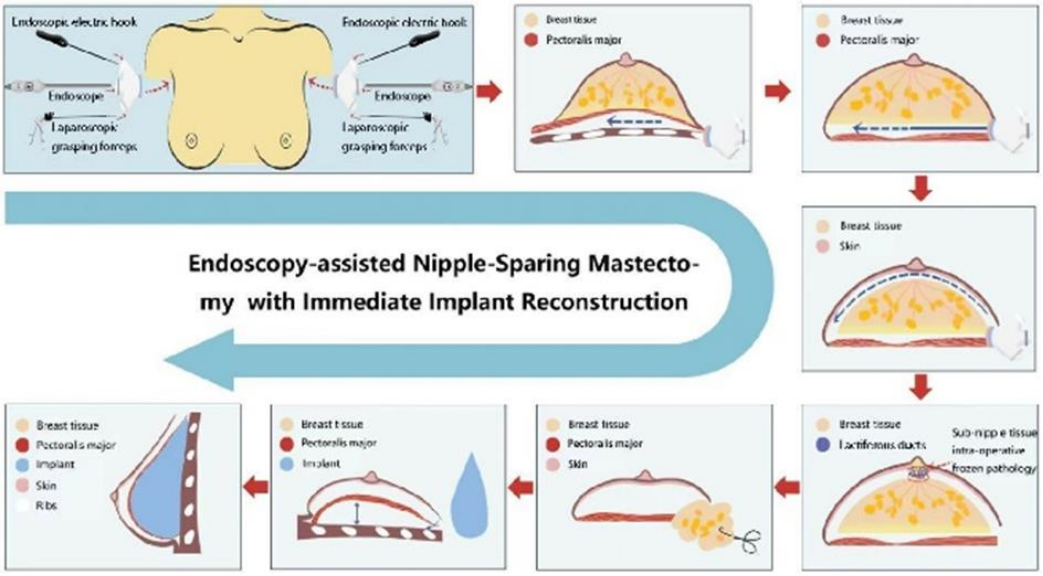

FIGURE 4: The process of endoscopy-assisted nipple-sparing mastectomy with immediate implant reconstruction. The steps are shown in arrowhead order and follow "submuscular-prepectoral-subcutaneous" dissection order. Implants are conducted in the subpectoral implant cavity.

Back to the direct vision condition, the retromammary space was dissected for 2-3 cm for the single-incision laparoscopic surgery trocar. Then, the retromammary space was dissected with endoscopy assisted from lateral to medial by the electric hook. Dissected upward to subclavian ligaments, medially to parasternal ligaments, laterally to the lateral border of parenchyma, and downward to triangular cluster ligaments. The adipose tissue was dissected to the dermis layer when separating the parenchyma edge, to facilitate subsequent disconnection of the mammary gland. Tumor projected pectoral major fascia was resected and other fasciae were reserved to avoid postoperative pain. The subcutaneous plane of the breast was dissected like the retromammary space but in the following order: superolateral quadrant, inferolateral quadrant, superomedial quadrant, inferomedial quadrant, sub-nipple tissue, and medial quadrant (Figure 5). The sub-nipple tissue was cut by laparoscopic scissors to avoid electro-cautery injuries to the nipple-areola complex and was taken intra-operative frozen pathology analysis to confirm whether free of cancer cells. If cancer cell invasion was found in the sub-areolar sample, the entire nipple-areola complex was removed. Finally, a 5 mm thick skin flap and a subpectoral muscular implant cavity were prepared. Both side breast glands were excised and removed through the axillary wound. Depending on the weight of the breast gland, a suitable size tissue expander was used to evaluate the implant visual effect and suitable size.

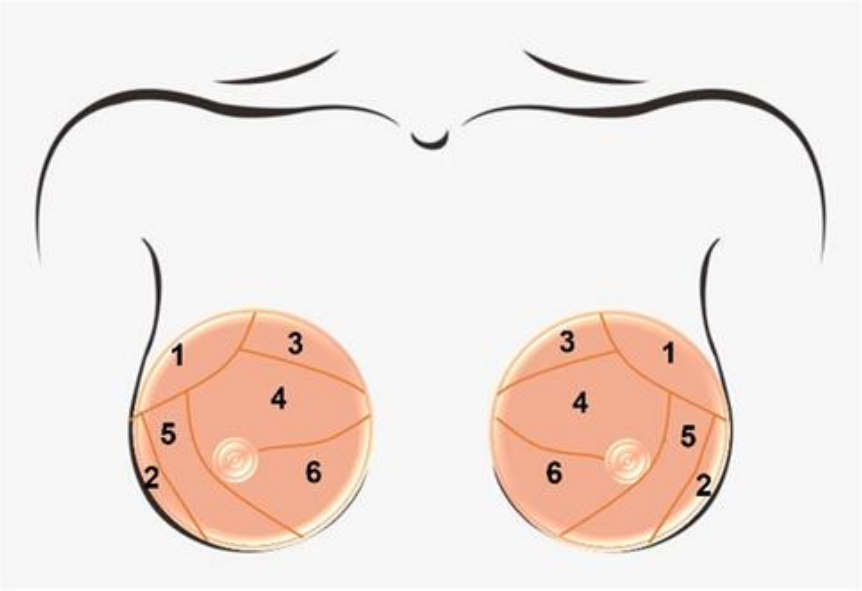

FIGURE 5: Dissect the subcutaneous plane of the breast in order from 1 to 6.

In this EABS part, DMS-EABS was operated on in a similar step as SMS-EABS, but two sides of the breasts were operated on simultaneously and the president surgeon monitored another main surgeon's operation in time to ensure the symmetry of the two sides.

2.6. Implant Cavity Irrigation and Breast Reconstruction

The implant cavity was irrigated with 2000 ml warm normal saline and soaked with 0.45%~0.55% povidone-iodine solution for 10 min. Two drainage tubes were placed on each side of the breasts to drain the superior and inferior parts separately. The operating area was disinfected again, and all surgery doctors replaced gloves. A prosthesis was then conducted into the subpectoral implant cavity, and the residual subpectoral implant cavity was closed by absorbable monofilament 3-0 suture. The axillary incision was sutured intradermally with a 4-0 absorbable suture. There is no difference between SMS-EABS and DMS-EABS in this part.

2.7. Follow-up System and Esthetic Outcome Evaluation

Patients come back hospital one week and one month after the operation to check their recovery condition and complications. Later, patients were followed up every 3 months and were suggested to take computed tomography or magnetic resonance, or ultrasound tests depending on their condition. Breast-Q questionnaires were investigated before surgery and one month after surgery to evaluate the patient's psychosocial well-being, sexual well-being, satisfaction with breasts, and physical well-being: chest.

2.8. Data analysis

Depending on the adaptability of continuous and categorical variables, the independent-sample t-test, rank sum test, and Fisher's exact test are used to analyze data. Differences were reported as means ± standard deviation (SD). P-value < 0.05 was considered statistically significant. All data were analyzed by SPSS version 25 (SPSS Inc., Chicago, IL).

3. Results

34 female patients who underwent endoscopy-assisted insufflation bilateral NSM with IIR were selected from The Sixth Affiliated Hospital of Sun Yat-sen University medical database. 18 of them underwent SMS-EABS and 16 of them underwent DMS-EABS. The mean age of SMS-EABS and DMS-EABS is 40.50±7.90 years old and 41.81±8.46 years old. The BMI of the two groups is 21.98±3.05 kg/m^2 and 21.82±3.79 kg/m^2. Patients' pathologic stage, pT stage, whether had

SLNB or ALND, pathology type, and subtype are described in (Table 1). Of all patients, five of them suffered fibroadenoma or duct papilloma but all over the breasts. Two patients were injected with amazingel previously and suffered benign tumors and breast pain. Four patients had bilateral breast cancer. One of them had ductal carcinoma in situ (DCIS) on the left but invasive ductal carcinoma (IDC) on the right. One bilateral breast cancer patient had different cancer subtype of two breasts. All clinical and demographic characteristics of patients have no significant difference between those two groups.

TABLE 1: Clinical and demographic characteristics of patients.

Variable	SMS-EABS (Patients N=18)	DMS-EABS (Patients N=16)	p value
Age (mean, y)	40.50±7.90	41.81±8.46	0.643
BMI (mean, kg/m²)	21.98±3.05	21.82±3.79	0.892
Follow-up time (months)	14.56±8.37	15.81±6.67	0.634
Pathologic stage, n (%)			0.884
0	4 (22.2%)	3 (18.7%)	
I	3 (16.7%)	3 (18.7%)	
II	4 (22.2%)	2 (12.5%)	
III	2 (11.1%)	4 (25%)	
IV	1 (5.6%)	0 (0.0%)	
Others	4 (22.2%)	4 (25.0%)	
pT stage, n (%)			0.965
Tis	4 (22.2%)	3 (18.8%)	
T1	6 (33.3%)	4 (25%)	
T2	4 (33.3%)	5 (31.3%)	
Others	4 (25.0%)	4 (25.0%)	
SLNB or ALND, n (%)			0.299
SLNB only	8 (44.4%)	3 (18.8%)	
SLNB and ALND	6 (33.3%)	9 (56.3%)	
Neither SLNB nor ALND	4 (22.2%)	4 (25.0%)	
Pathology, n (%)*			0.602
IDC	10 (52.6%)	9 (56.3%)	
DCIS	5 (26.3%)	2 (12.5%)	
Others	4 (21.1%)	5 (31.3%)	
Subtype, n (%)*			1.000
Luminal A	5 (27.8%)	5 (29.4%)	
Luminal B	5 (27.8%)	4 (23.5%)	
HER-2 type	3 (16.7%)	4 (23.5%)	
TNBC	1 (5.56%)	0 (0.0%)	
Others	4 (22.2%)	4 (23.5%)	

*Four patients suffered bilateral breast cancer and some of them had different pathologies or subtypes of two breasts.

SMS-EABS: Single-Main Surgeon's Endoscopy-Assisted Breast Surgery; DMS-EABS: Dual-Main Surgeons' Endoscopy-Assisted Breast Surgery; BMI: Body Mass Index; SLNB: Sentinel Lymph Node Biopsy; ALND: Axillary Lymph Node Dissection; IDC: Invasive Ductal Carcinoma; DCIS: Ductal Carcinoma *in situ*; HER-2: Human Epidermal Growth Factor Receptor 2; TNBC: Triple-Negative Breast Cancer.

The blood loss of SMS-EABS is 51.67±41.62 ml, which is more than DMS-EABS with 29.38±14.36 ml. The operation time of DMS-EABS is 4.38±0.65 h, which is shorter than SMS-EABS with 5.56±0.82 h. The DMS-EABS has the advantages of both less blood loss and shorter operation time and those P values are <0.05. However, the post-operation hospital stay is less beneficial of DMS-EABS than SMS-EABS, but this is no statistical significance. The operation costs in DMS-EABS are almost 4000 RMB cheaper than SMS-EABS group, which may be due to less anesthesia fee of DMS-EABS group. In the postoperative evaluation, both groups have six patients suffering postoperative complications and there is no statistical difference in the complications between the two groups.

Before and one month after the EABS, all patients' psychosocial well-being, sexual well-being, satisfaction with breasts, and physical well-being: chest were evaluated by breast-Q questionnaires. Compared to the breast-Q score of the two groups, all difference has no statistical significance (Table 3). The difference between before and one month after surgery between SMS-EABS and DMS-EABS is also no statistically significant difference. We also record patients' picture views before and after the surgery (Figure 6).

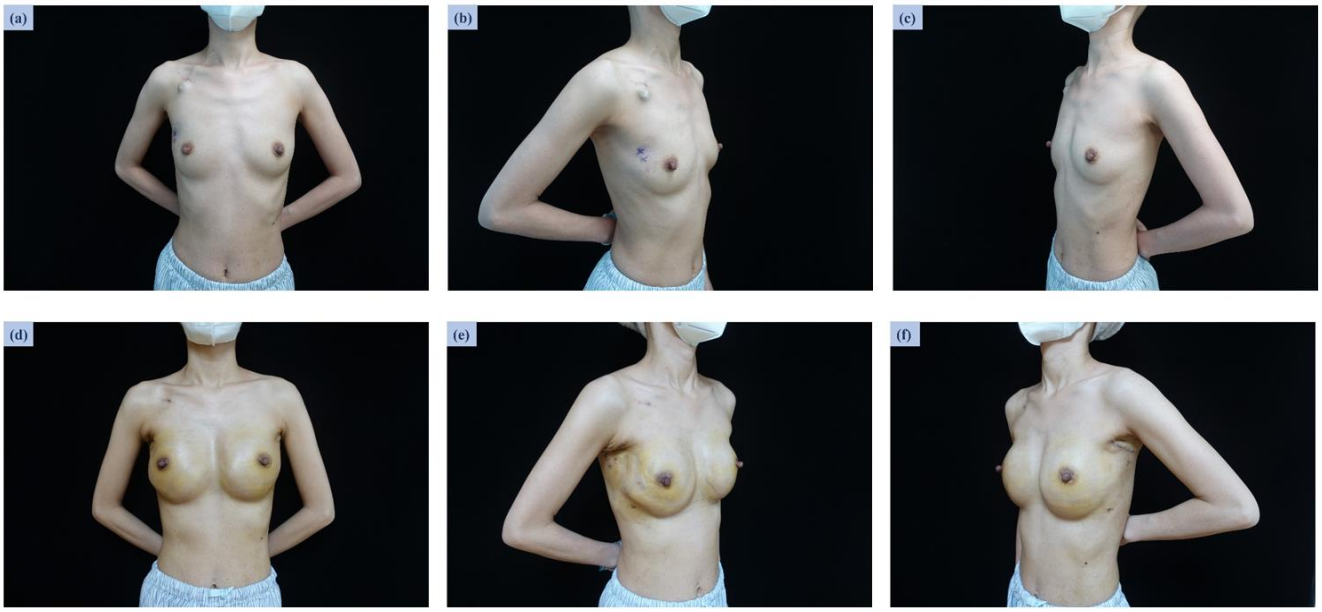

FIGURE 6: Pre- and postoperative pictures of patients who received endoscopy-assisted insufflation bilateral nipple-sparing mastectomy with immediate implant reconstruction. **a-c)** The front, right lateral, and left lateral views of a female with right breast cancer before operation. **d-e)** The front, right lateral, and left lateral view of the patient after surgery for one month. A bulge below the right clavicle is a port-cath.

4. Discussion

Endoscopy-assisted nipple-sparing mastectomy (E-NSM) with IIR has been an established technique in the field of breast surgery, especially for breast cancer patients who cannot have BCS [3, 7, 8, 11-15]. Compared with conventional breast surgery (CBS), E-NSM with IIR has a better aesthetic outcome and health-related quality of life [3, 11-13], and researchers also cannot find a significant difference in local recurrence, distant recurrence, disease-free survival, and overall survival between EABS and CBS [11, 14, 15]. It is also confirmed that EABS has a better result of blood loss, wound length, and cosmetic satisfaction than CBS and is named "aesthetic scar-less" surgery [8, 13, 15]. Normally, EABS has longer operation time, longer hospital stays, and more cost, which limits its development and application [6, 7, 14]. However, after several cases of practice, the operation time decreases a lot [8, 15, 16] and DMS-EABS can also be a good way to reduce operation time and blood loss as shown in (Table 2). However, due to the guidance from superior doctors during surgeries, young surgeons can reduce the learning curve and improve themselves quickly.

TABLE 2: Perioperative safety evaluation for endoscopy-assisted insufflation bilateral nipple-sparing mastectomy with immediate implants reconstruction.

Variable	SMS-EABS (Patients N=18)	DMS-EABS (Patients N=16)	p-value
Blood loss (ml, 95%CI)	51.67±41.62	29.38±14.36	0.045
Operation time (min, 95%CI)	5.56±0.82	4.38±0.65	<0.001
Post-operation hospital stay (days, 95%CI)	10.11±3.16	10.69±4.94	0.684
Implant volume (cc, 95%CI)	266.67±57.80	273.44±62.23	0.744
Operation costs (RMB, 95%CI)	69678.20±16386.59	65873.75±11324.85	0.443
Operative complications, n (%)			0.649
capsular contracture	1 (5.56 %)	0 (0.0%)	
prosthesis moving up	0 (0.0%)	1 (6.25%)	
nipple-areola complications	3 (16.67 %)	1 (6.25 %)	
subcutaneous emphysema	1 (5.56 %)	2 (12.5%)	
skin burn	1 (5.56 %)	2 (12.5%)	

RMB: Renminbi. One patient in SMS-EABS group has no operation costs data.

With the development of EABS, many surgeons have created a variety of methods, and each has its advantages. In West China Hospital and our hospital, CO_2 insufflation technique is preferred, but Taiwan hospitals prefer the retraction technique [8, 11]. The inflation pushes Cooper's ligaments to help dissection and reduces bleeding with positive pressure [11, 17, 18], which also can help us to explain the little blood loss in (Table 2). Retraction EABS can help patients avoid hypercapnia or subcutaneous emphysema induced by carbon dioxide but may strain skin [3, 11, 15, 18, 19]. Even though three trocars EABS can be operated on in breast surgery similar to laparoscopy [20], single-port EABS is more

popular due to less scarring [8, 10-12, 18]. In our surgery, we use a disposable single-incision laparoscopic surgery trocar with good stability. In West China Hospital, they prefer to wrap the wound protector opening end with a sterile surgical glove as the endoscopic port and bladeless trocars are inserted into the fingerholes of the glove, which makes it more flexible for operation [8, 12]. They also create a "HUAXI Hole 1" to assist the dissection of the subcutaneous plane and sub-nipple tissue [8, 12]. Three-dimensional E-NSM and robotic NSM can be a better way in EABS because of their clear view or meticulous operation but are limited by the expensive cost [10, 21]. However, DMS-EABS is about 4000 RMB cheaper than SMS-EABS, which may be due to lower anesthetic fees (Table 2).

Unilateral breast cancer (UBC) diagnosed women have an increased risk of suffering bilateral breast cancer (BBC) and the cumulative incidence rate for UBC patients to develop contralateral breast cancer (CBC) at 10 years is about 3.4% [22]. For patients with early age of onset, hormone receptor-positivity of the initial tumor, family history of breast cancer, and *BRCA1/2* or *CHEK2* mutation, they have a higher risk of BBC and bilateral mastectomy is a popular way to treat and prevent BBC [23, 24]. The contralateral prophylactic mastectomy (CPM) rate of stage I-III breast cancer women increased from 1.8% in 1998 to 12.7% in 2012 and the increasing trend hasn't stopped [25, 26]. In Judy. C *et al.* research, CPM represented a 95% decreased risk of CBC (hazard ratio=0.05) and CPM improved overall survival and disease-free survival [27]. Based on patients' expectation of longevity and their requirement for more aesthetically pleasing breasts, we give them bilateral E-NSM with IIR.

Due to the relative independence and little interference of bilateral mammary structures, we propose DMS-EABS to resect bilateral breasts simultaneously. Small operation space and inflexibility of the instrument limit EABS operation speed. The risk of perioperative complications increases linearly with increasing operative duration and longer operative duration increases complications [28, 29]. Long operation time increases the risk of anesthesia and thrombosis in patients [30]. It is also confirmed that blood loss and duration of surgery are independent risk factors for complications after breast reconstruction [31]. As introduced previously, making good use of the patient's position and operative space, two main surgeons operate bilateral breasts mastectomy at the same time with similar dissection steps as a single surgeon's surgery. Instead of dissecting breasts side by side in SMS-EABS, DMS-EABS simultaneous operation greatly reduces operation time and blood loss as improved in (Table 2). Dual-main surgeons' surgery has been applied in hepatobiliary surgery and gastrointestinal surgery: dual-main surgeons' laparoscopic anatomical hepatectomy [32] and taTME [9]. In taTME, one surgeon dissects from anal to tumor, and another surgeon dissects from abdominal colon with laparoscopy simultaneously. Comparing taTME and laparoscopic total mesorectal excision, taTME has shorter surgery time and less blood loss [9]. Therefore, dual-main surgeons' surgery can be a good way to improve EABS and should be popularized.

TABLE 3: Breast-Q scale scores of patients.

Variable	SMS-EABS (Patients N=18)	DMS-EABS (Patients N=16)	p-value
Before surgery			
Psychological well-being	76.72±21.23	63.56±19.45	0.070
Sexual well-being	60.50±20.33	46.31±20.61	0.052
Satisfaction with breasts	58.39±22.79	51.75±19.91	0.375
Physical well-being: chest	14.50±19.66	23.25±28.49	0.301
One month after surgery			
Psychological well-being	61.22±19.38	57.56±20.02	0.592
Sexual well-being	54.83±26.40	52.31±26.98	0.785
Satisfaction with breasts	65.44±17.29	66.00±19.43	0.930
Physical well-being: chest	25.11±21.72	30.75±23.87	0.476
Difference between before and one month after surgery			
Psychological well-being	15.50±27.90	6.00±28.90	0.337
Sexual well-being	5.67±27.23	-6.00±24.94	0.204
Satisfaction with breasts	-7.06±22.55	-14.25±28.24	0.415
Physical well-being: chest	-10.61±20.51	-7.50±27.58	0.709

BREAST-Q® version 2.0 © Memorial Sloan Kettering Cancer Center and The University of British Columbia, 2017. The difference is equal to the score before surgery minus one month after surgery.

The limitations of this technique or research are as follows: First, at the study stage, the operation time is long because of the small operation space, inflexibility of the instrument, and unskilled operation and cooperation. However, in learning curve studies of endoscopic total mastectomy, the operation time can be reduced a lot after cases of practice [8, 16]. Secondly, because of lots of equipment needed and crossed vision of endoscopy, DMS-EABS requires more for nurses and the entire surgical team, which leads to a longer study time. Thirdly, in this study, we only collect 34 patients' data retrospectively, a larger prospective randomized controlled trial study is needed to confirm those results.

5. Conclusion

In conclusion, the longer operation time of EABS than CBS limits its development, especially for bilateral E-NSM with IIR. Based on the aesthetic advantages of EABS, DMS-EABS can also reduce operation time and blood loss, improving operative safety. In the future, EABS training system should include DMS-EABS model, which may achieve better results in breast surgical treatment.

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Conflicts of Interest

None.

Author Contributions

All authors contributed to conceptualization, material preparation, data collection, and analysis. The first draft of the manuscript was written by Ziteng Liu, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Data Availability

All data used and analyzed in this study are available from the corresponding author upon reasonable request. E-mail could be sent to corresponding author e-mail address.

Ethics Approval

This study was approved by the Ethics Committee of the Sixth Affiliated Hospital of Sun Yat-sen University (No.2023ZSLYEC-068).

Consent to Participate

Informed consent was obtained from all individual participants included in the study.

Consent to Publish

The authors affirm that human research participants provided informed consent for publication of the images in (Figures 1 and 6a-6f).

Abbreviations

EABS: Endoscopy-Assisted Breast Surgery
SMS-EABS: Single-Main Surgeon's EABS
DMS-EABS: Dual-Main Surgeons' EABS
BCS: Breast-Conserving Surgery
NSM: Endoscopy-Assisted Nipple-Sparing Mastectomy
SSM: Skin-Sparing Mastectomy
IIR: Immediate Implant Reconstruction
taTME: Transanal Total Mesorectal Resection
SLNB: Sentinel Lymph Node Biopsy
ALND: Axillary Lymph Node Dissection
SD: Standard Deviation
DCIS: Ductal Carcinoma *in situ*
IDC: Invasive Ductal Carcinoma
E-NSM: Endoscopy-Assisted Nipple-Sparing Mastectomy
CBS: Conventional Breast Surgery
UBC: Unilateral Breast Cancer
BBC: Bilateral Breast Cancer
CBC: Contralateral Breast Cancer
CPM: Contralateral Prophylactic Mastectomy

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