“Nine-step method” mastoscopic scar-hidden surgery on gynecomastia—a single-institution large sample experiences

Chengyu Luo (luochengyu@163.com)  
Capital Medical University affiliated Beijing Anzhen Hospital

Shuqi Zhang  
Capital Medical University affiliated Beijing Anzhen Hospital

Changsheng Wei  
Capital Medical University affiliated Beijing Anzhen Hospital

Yang Guo  
Capital Medical University affiliated Beijing Anzhen Hospital

Yajing Zhang  
Capital Medical University affiliated Beijing Anzhen Hospital

Research Article

Keywords: gynecomastia, mastectomy, surgery

Posted Date: January 13th, 2023

DOI: https://doi.org/10.21203/rs.3.rs-1937456/v2

License: ☺  This work is licensed under a Creative Commons Attribution 4.0 International License.  
Read Full License
Abstract

**Background:** To summarize the experiences on the mastoposcopic subcutaneous mastectomy for gynecomastia by "nine-step method" based on the "5S" goal and standardize this operation.

**Patients and methods:** Between January 1st 2002 and October 31st 2021, a total of 2035 breasts of 1082 male patients with gynecomastia, of which 129 patients with one side, were underwent mastopscopic subcutaneous mastectomy.

**Results:** All patients were successfully completed the operation, and none of them was transferred to open operation. The operation time for unilateral breast was 12-28 min, and the average time was 17.7±6.2 min. The amount of bleeding during unilateral operation was very small, about 5-10ml. The total drainage volume was 5ml~50ml after the operation, and the drainage tube was removed in 3~5 days. The epidermal necrosis occurred in 0.3% nipple. 0.2% chest wall had a little ecchymosis in the upper-inner region of the breast. All patients had the normal feeling of nipples and areola, the smoothing and symmetrical chest wall, and the natural contour. There was no recurrence during the follow-up period.

**Conclusions:** The mastoposcopic subcutaneous mastectomy for gynecomastia by "nine-step method" based on the "5S" goal has a short operation time, few surgical complications and good esthetics. It achieving the "5S" goals on the complete removal of glandular tissue sweeping, small and scar-hidden incision are small, scarless, good symmetry of bilateral chest wall (symmetry), normal chest shape (shape), and smoothing chest wall smoothing.

Introduction

Gynecomastia is the most common in male breast disease, accounting for about 60–80%. The cause is mainly related to the absolute or relative increase in estrogen level in the body. In recent years, with the excessive intake of high-fat diet, the influence of estrogen in food, the improper application of health care products, its morbidity has increased obviously.\(^1\)\(^-\)\(^4\) Patients often have a serious psychological burden. More than half of them have the experience of being ridiculed and isolated, and they will experience low self-esteem, which seriously affects daily life and social interaction. If timely and effective treatment is not taken, it may cause depression, anxiety, or even autism and other diseases. For this reason, patients and their family members have a very urgent need for rehabilitation, and they are concerned about the chest shape and the incision scar after operation. They are unwilling to being known about their surgical experience by others. Therefore, the surgical goals need the following 5 points (5S goals): (1) Remove all breast tissue (sweeping); (2) Concealed incision scar (scarless); (3) Bilateral symmetry (symmetry); (4) Normal male chest shape (shape); (5) Smoothing appearance after operation (smoothing).

Mastoscopic scar-hidden minimally invasive surgery for gynecomastia with complete removal of glandular tissue, small and concealed incision scars, short operative time, can be regarded as an effective method. It has been carried out in many medical centers worldwide. However, the incision approach and surgical procedures are very different, so the operative thoroughness, operative time, and effect were very
different, and it is urgent to be standardized.\textsuperscript{5−9} From January 2002 to the present, for nearly 20 years, we have carried out this operation based on the "nine-step method" for 1082 patients with gynecomastia, 129 of which were unilateral and operated on a total of 2,035 breasts. This method achieved a better operative effect. The "nine-step method" of surgical operation and related key points are summarized.

**Materials And Methods**

**Patients**

Between January 1st 2002 and October 31st 2021, a total of 2035 breasts of 1082 male patients with gynecomastia, of which 129 patients with one side, were underwent mastopscopic subcutaneous mastectomy. Informed consent was obtained from the participating patients. The protocol was approved by the institutional review board committees of all institutions in compliance with the Declaration of Helsinki and guidelines for good clinical practice. The patients' age ranged from 17–79 years, average of 37.6 ± 10.2 years. The disease history was from 2–34 years, average of 7.8 ± 4.1 years. Preoperative physical examination and color-ultrasound both indicated the glandular hyperplasia. The inclusion criteria were: (1) Simon IIB level and above; (2) lasting at least 24 months; (3) affecting physical and mental health; (4) strongly demanding the surgery. The study was approved by the institutional ethics of research committee and written consent was obtained from each patient.

**Surgical Procedure**

The liposuction range was marked in the standing position before surgery(Figs. 1). Under general anesthesia, the patient was placed in the supine position with the ipsilateral arm abducted to 90°. The patient's forearm was hung to the head frame of the bed to the level of the nose head. Excessive lifting will tighten the chest skin and affect the operative space(Figs. 2). A monitor was placed on the contralateral side of the upper side of the patient's head. For example, while operating the breast on the left side, the surgeon will watch the monitor in front of the patient's head on the upper right.

Alipolysis liquid (saline 200 ml, distilled water 200 ml, lidocaine 400 mg, adrenaline 0.5 mg) was prepared for each breast injection(Figs. 3), according to the method reported previously.\textsuperscript{10−14}

**Injection of lipolysis liquid**

(1) 50ml syringe is easy to be used. (2) The Long needle is convenient for injecting the liquid to the distant place of the breast. (3) The injection sequence was important. The breast rear (the front of the pectoralis major fascia) should be injected first so that the injection needle can be placed easily into the breast rear by grasping the breast. If the liquid is injected first into the front of the breast (subcutaneous tissue), the whole breast will become full. Then the breast can't be easily grasped, which increases the difficulty of injecting the lipolysis liquid into the breast rear. Subsequently, the breast is grasped from the outside. The
liquid is injected successively into the outside, the front, the head side, the tail side, and finally, the inside of the breast.

**Liposuction**

(1) Liposuction started 10 minutes after the injection of lipolysis liquid. (2) Suction incision was made below the axilla, at the junction of the mid-axillary line and the upper margin of the breast. This incision was also the trocar hole for the mastoscopy subsequently. (3) Suction hole was first cut to 7 ~ 8mm long. During sucking, this hole will be distended a little. If a 1cm incision is made at the beginning, the repeated sucking action will expand the hole. The gas will release around the loose 10mm trocar for mastoscopy, which affects the mastoscopy operation. (4) The No. 8 suction head used for artificial abortion was convenient. It is economical, affordable, durable, and, more importantly, fast. (5) Suction range should cover all the previously marked regions of the breast and the deep part of the breast. (6) When sucking behind the breast, it is advisable to grab the breast. The suction head cannot be inserted too deep to avoid entering the pectoralis major muscle. (7) After the suction is estimated to end, the liposuction effect should be checked by sweeping or slightly swinging the suction head from side to side, especially in the rear of the breast, to confirm that the suction has been perfect.

**Trocar location**

The liposuction hole is a camera hole. The two operating holes are respectively located at the junction of the nipple with the mid-axillary line and the lower border of the breast with the mid-axillary line. Scissors and forceps are placed into each other, which can exchange at any time according to operative needs.

**Air cavity pressure control**

Steady gas pressure in axillary space is essential in assuring the operation smoothly. Excessively high gas pressure may increase the possibility of postoperative subcutaneous emphysema and affect the large blood vessels in the upper part of the thoracic cage. On the other hand, a lack of sufficient gas pressure could result in contraction or expansion of the operative space as the patient breathes, making the procedure more difficult. 8 ~ 9mmHg gas pressure is generally suitable.

**"Nine-step method" of operation process**

The mastoscopic scar-hidden surgery for gynecomastia was turned into a process by us. The overall operation follows a "spatial sequence" of "from outside to inside" and "three-dimensional outflanking." (1) the lateral side of the breast gland. (2) the front part of the gland, namely Cooper's ligament. (3) the outer-upper part. (4) the rear. (5) the inner-upper. (6) the outer-lower. (7) the inner-lower. (8) beneath the nipple. (9) the medial. At this point, the breast gland has been entirely dissociated. The breast gland was taken out from the 10mm trocar hole under the axilla.

**Managing the bleeding**
After the glands were taken out, the 10mm trocar was reinserted and inflated. The bleeding should be completely managed under the endoscopy. At last, the wound was washed with saline.

**Flattening the front chest wall**

The relative collapse in the central part and the slight uplift in the outer periphery of the breast will appear after the taken-out of the breast gland. It is necessary to perform sucking in the outer periphery of the breast, which makes the front chest wall more smooth-going and avoids the "volcanic crater" phenomenon. The aesthetic appearance enhances further.

**Observation of symmetry**

The bilateral front chest should be compared. If necessary, the protruding area can be equated by additional lipolysis.

**Flattening breast skin**

For those with large breasts and more skin, the skin should be distributed evenly on the chest to avoid skin folding.

**Drainage and bandaging**

High negative pressure drainage was placed from the 10mm trocar hole, and the trocar incision was sutured intracutaneously with 4 − 0 absorbable thread. Lastly, the chest and axilla were bandaged.

**Results**

All patients were successfully completed the operation, and none of them was transferred to open operation. The gynecomastia was confirmed in all breasts by pathological diagnosis after operation. The operation time for unilateral breast was 12−28 min, and the average time was 17.7 ± 6.2 min. The amount of bleeding during unilateral operation was very small, about 5-10ml, which was almost negligible. The total drainage volume was 5ml ~ 50ml after the operation, and the drainage tube was removed in 3 ~ 5 days. The epidermal necrosis occurred in 7 nipple(7/2035, 0.3%)in the earlier 2 months of this operation pursued by us. They returned to normal after the epidermal necrosis fell off within one month. 4 chest wall 4/2035,0.2% had a little ecchymosis in the upper-inner region of the breast, which disappeared in about two weeks. All patients did not have chest wall emphysema, subcutaneous seroma, and subcutaneous effusion. No infection occurred.

The follow-up endpoint was 3 months after surgery. All patients had the normal feeling of nipples and areola, the smoothing and symmetrical chest wall, and the natural contour. Even in patients with large breasts before surgery, no pouchy skin appeared. The patients were satisfied with the results and the appearance of the chest. There was no recurrence during the follow-up period.
Discussion

At present, there are several methods for resection of gynecomastia: open surgical resection, Simple liposuction, liposuction + open, and vacuum-assisted biopsy. Different surgical procedures have their own characteristics(Table 1).

<table>
<thead>
<tr>
<th>The characteristics of various resection methods for gynecomastia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Open</strong></td>
</tr>
<tr>
<td>Completeremoval of glandular tissue</td>
</tr>
<tr>
<td>Chance of recurrence</td>
</tr>
<tr>
<td>Bleeding</td>
</tr>
<tr>
<td>Possibility of uneven chest wall after surgery</td>
</tr>
<tr>
<td>Possibility of skin necrosis</td>
</tr>
<tr>
<td>Skin incision</td>
</tr>
</tbody>
</table>

Mastoscopic resection surgery for gynecomastia has the advantages of thorough removal of glandular tissue, low recurrence, little bleeding, low postoperative chest wall unevenness, low skin necrosis, small and hidden skin incisions, etc. However, there are still phenomena such as a long operation time, a bit more complications and still undesirable effect. We have been adapting the mastoscopic scar-hidden resection for gynecomastia by the "nine-step method" based on the "5S" goal for nearly 20 years. The operative effect improves significantly. Combing with the results of this research, some key points are suggested below.

**Change the position of the trocar**

The 10mm trocar hole is placed in the armpit, so that there is no large incision in the middle and lower part of the axilla that is easily exposed daily. The postoperative scar is more concealed.

**Optimize the operative process—Nine-steps method** (Video 1): (1) The lateral side of the gland is first disconnected. The space between the front and rear of the gland can be opened only after the lateral side of the gland is free. (2) The front of the gland, namely the subcutaneous part, is subsequently disconnected. At this time, the camera-holding hand is often needed to be linked with both hands. One hand lifts the endoscope in the front section of the endoscope, and another hand adjusts the direction in the tail of the endoscope. The Cooper ligament should be disconnected near the gland, so that there is some thickness in subcutaneous tissues. It enhances the chest aesthetics. The outer-upper margin of the gland is easily disconnected up along the outer side of the gland. The rear of the gland is
disconnected in the surface of the anterior fascia of the pectoralis. The anterior fascia of the pectoralis can't be damaged. There are only several tiny strips between the rear of the gland and the anterior fascia of the pectoralis. They are easily cut off. The inner-upper margin of the gland is disconnected. The largest intercostal perforating branch of the internal thoracic artery is often encountered in this area, which needs to be identified and cut off after electrocoagulation to prevent bleeding. This step becomes the key point to control the bleeding in the operation. Once bleeding occurs, it often appears gushing from the artery and is stubborn. The electrocoagulation can just stop it (Video 2). Because this blood vessel is very close to the skin, the superficial skin can't be damaged during electrocoagulation and to avoid the most severe complication-skin necrosis. In our study, a little ecchymosis appeared in only 0.2% chest walls in those upper-inner regions, which disappeared in about two weeks. None was transferred to open operation because of uncontrolled bleeding. The operative safety improves further. The outer-lower margin of the gland is disconnected along down the lateral margin. Next, the inner-lower margin of the gland is disconnected. The gland tissue is cut off just beneath the nipple. If the gland tissue of this place is cut off in the previous step, the breast will lose its fixation point. It is inconvenient to separate the around the gland. Lastly, the medial side of the gland is disconnected. So far, the breast gland has been completely free.

Beware of nipple necrosis and nipple depression

The causes of nipple necrosis are related to surgical trauma, blood supply disorders and etc. When the operation reaches below the nipple, the assistant had better lifts and pulls the nipple vertically from outside the skin (Figs. 4). A certain amount of glandular tissue needs to be kept under the nipple. Its main purpose is to ensure adequate blood supply and prevent nipple necrosis. Meantime, it prevents nipple depression and maintains the shape of the nipple and areola. The thickness of the glands below the nipple to be retained is at least 5mm, which is exactly the same as the diameter of the head of the endoscope scissors (Figs. 5). If it is too short, the postoperative nipple will be sunken. If it is too long, it will cause the nipple to bulge. Both of them can greatly offset the hope to the operative aesthetics. Electric hooks or scissors have a higher heat, and it is better to use electric scissors to directly cut without electricity when operating below the nipple and areola. In this study, only 7 (0.3%) of the nipple had epidermal necrosis after surgery, and they appeared within the first two months of the operation by us. No similar complications have occurred since then.

Take off the excised breast glands Ingeniously

First, a little gland is pulled out from the 10mm trocar hole under the axilla with forceps. When it can't be pulled out, the marginal part of the gland tissue stuck by the trocar hole is cut off using knife, and to be pull it out again. This process is repeated over and over again until whole gland is completely taken out. Last, the gland becomes a long strip, so it is very convenient to remove it completely without expanding the trocar hole (Figs. 6).

Flatten the surplus skin
The patient's skin has an amazing ability to retract after removing the gland, so there is no need to trim and cut off the surplus skin. The skin should be spread over the chest wall. There is no skin removal in this series of cases, and no secondary skin treatment is required after surgery. The skin flaps in all of patients fit with the chest wall well.

**Adjust the location of the drainage**

The drainage tube is placed in the large trocar hole in the axilla, so that the incisions of the two 5mm trocar holes in the middle and lower axilla can heal well. The incision scar reduced further.

In conclusion, the mastopscopic subcutaneous mastectomy for gynecomastia by "nine-step method" based on the "5S" goal has a short operation time, few surgical complications and good esthetics. It achieving the "5S" goals on the complete removal of glandular tissue(sweeping), small and scar-hidden incision are small scarless , good symmetry of bilateral chest wall (symmetry), normal chest shape (shape), and smoothing chest wall smoothing.

**Declarations**

**Ethics approval and consent to participate**: The study was approved by the institutional ethics of research committee and written consent was obtained from each patient. Written informed consent was obtained from participants to participate in the study. The research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki.

**Consent for publication**: Written informed consent was obtained from participants for publication in the study.

**Availability of data and materials**: All data generated or analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

**Competing interests**: The authors have no conflicts of interest to declare.

**Funding**: This work was funded by Capital Medical development fund to Dr. Chengyu 2002033131.

**Author Contributions**: Chengyu Luo had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. *Concept and design*: Chengyu Luo, Shuqi Zhang. *Acquisition, analysis, or interpretation of data*: Chengyu Luo, Shuqi Zhang, Changsheng Wei. *Drafting of the manuscript*: Shuqi Zhang, Changsheng Wei, Yang Guo, Yajing Zhang. *Critical revision of manuscript for important intellectual content*: Chengyu Luo, Shuqi Zhang. *Obtained funding*: Chengyu Luo. *Administrative and technical support*: Chengyu Luo, Shuqi Zhang, Changsheng Wei. *Supervision*: Chengyu Luo, Shuqi Zhang.

**Acknowledgements**: The authors would like to thank all the participating clinicians, research nurses and patients. We also appreciate the support of our other colleagues for provided valuable insight to guide the
design of the animation of mastoscopic operation at The Capital Medical University: Guang C, MD, PhD; Jingan Z, MD, PhD; Yang L, MD, PhD; and the clinical and administrative staff of the Department of General Surgery.

**Study Approval Statement:** This study protocol was reviewed and approved by Capital Medical University Affiliated Beijing Anzhen Hospital Ethics Committee, approval number [2001(047)].

**References**


**Figures**
Figure 1

Legend not included with this version.
Figure 2

Legend not included with this version.
Figure 3

Legend not included with this version.
Figure 4

Legend not included with this version.
Figure 5

Legend not included with this version.

Figure 6

Legend not included with this version.
Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Video1.Animationdiagramofmastososcopicoperation..mp4
- Video2.Thebleedingmanagementinupperinnermargin..mp4