



Mammoplasty to Treat Macromastia

Restoring function and self-esteem to women who suffer from enlarged breasts

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The patient is a 40-year-old woman with a history of early breast growth who has struggled with back pain for years. The pain has become significantly worse in the past few years and she has developed neck and shoulder pain as well. The patient has increased difficulty running, and has chronic rashes at the inframammary fold in spite of meticulous care. The patient has recently developed numbness and tingling in both of her hands due to the increased weight on her brachial plexus from her breasts. The patient is currently wearing a bra cup size of 38 or 40 E and wishes for a breast reduction. Breast demonstrate 3+ ptosis.

A mammogram was performed in 2011, which returned negative. The patient is a nonsmoker and works out regularly. Bilateral breast hypertrophy was found to be both the preoperative and postoperative diagnosis.⁹

PATHOPHYSIOLOGY

Reduction mammoplasty is performed to re-establish a functional and proportional bust to the patient's body. Reduction is indicated in patients who suffer from secondary health problems relating to their macromastia. These secondary health complications can include diminished blood circulation, sleep apnea (from the weight of the breasts), skin chaffing, kyphosis and indentations to the shoulders caused by the bra straps supporting the tissue. The definitions for enlarged breasts are <500gm (454gm=1 pound) per breast while gigantomastia is defined as <1,000 gm increase per breast.⁵

LEARNING OBJECTIVES

- ▲ Examine the reasons why patients would opt for a mammoplasty
- ▲ Review the relevant anatomy and physiology related to this procedure
- ▲ Identify the surgical technique used to perform a mammoplasty
- ▲ Determine what instruments and equipment is necessary to have available for breast reduction
- ▲ Compare and contrast the benefits of a mammoplasty to treat macromastia



Before



After



Before



After

The most common time in a woman's life for large breast development is during the larche or pubertal breast development stage. However, enlarged breasts can occur due to genetic predisposition, following the birth of a child, during menopause or after weight gain. All of these factors produce hypertrophy within the adipose fat tissue of the breast. The degree of hypertrophy of the breast tissue is dependent of the weight added and has a variable range from mild (>300gm) to moderate (300-800gm) to severe (<800gm).¹ As the breasts enlarge, the suspensory ligaments, also known as Cooper's ligaments, are unable to support the

weight and the degree of breast ptosis increases. The degree of breast ptosis is determined by the degree to which the nipple has fallen below the patient's inframammary fold.²

Prior to surgery, a medical history is taken which includes the patient's age, number of children she has borne, future planned pregnancies, breastfeeding practices with each child, known allergies, pain and numbness and family history of breast cancer. Because of the debilitating size of their breasts some patients may suffer from depression, self-esteem issues and anxiety.⁷ A mammogram and a routine breast exam are required prior to surgery.⁸

RELEVANT ANATOMY AND PHYSIOLOGY

The nipple-areola complex (NAC) and the blood supply relating to it are the priorities when performing this surgery. The breast is supplied arterially from the medial aspect by the internal mammary artery and laterally from the lateral thoracic artery and the 3rd-7th intercostal perforating arteries.⁶

Drainage of the venous blood is performed by the superficial vein system under the dermis. The primary lymph drainage system is the retromammary lymph plexus found in the pectoral fascia.

Beginning at the skin and descending to the rib cage, the breast skin is made of three layers: the epidermis, the dermis and the hypodermis. The thickness of the hypodermis will vary from patient to patient and body region. The nipple and areola are constructed of a modified and specialized myoepithelium that is responsible for contraction in response to stimuli.⁴ Breast sensation is controlled by the peripheral nervous system. The PNS innervates the anterior and lateral cutaneous branches of the 4th-6th intercostal nerves.⁶ Researchers believe sensation to the nipple derives largely from the lateral cutaneous branch of T4.³

The adipose tissue of the breast is a lipid rich fatty layer containing glandular, milk-producing tissues. The breast contains lobules and the lactiferous glands, which widen to form an ampulla at the nipple. The ratio of fatty tissues and glandular tissues varies from patient to patient.



Astley Cooper

Breastfeeding and the onset of menopause increase the fatty tissue and diminish the glandular tissue.³

Suspensory ligaments, as described by Astley Cooper in 1840, run in the subcutaneous layer of adipose tissue throughout

the breast. This tissue is integrated with the small Cooper's ligaments, which extend obliquely to the skin surface and from the skin to the deep pectoralis fascia.

The pectoralis fascia lies superior to the ligaments and covers the pectoralis major muscle as a thin superficial membrane. The pectoralis major muscle originates at the anterior surface of the sternum and inserts into the anterior surface of the medial half of the clavicle.

The chest muscles lay inferior to the breast and the pectoralis fascia. These muscles are composed of the pectoralis major, the pectoralis minor, intercostal muscles of the ribs and can cover portions of the anterior serratus muscle. These chest muscles can be traumatized by

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the posture adopted by the patient who is suffering from enlarged breasts. As the weight of the breast sags the tissue, the pectoralis major and minor can suffer from shearing forces while the patient is standing, compression injury while lying supine and tension forces while kneeling on all fours. These injuries and forces can make exercise painful and unbearable.

Lastly, the portions of the ribcage the breast can lay on are the 2nd, 3rd, 4th, 5th and 6th thoracic ribs. These ribs provide the structural support for the mammary glands.⁶

EQUIPMENT

The patient's legs are dressed in anti-embolism knee high stockings and sequential compression devices to prevent the formation of a deep venous thrombosis. The patient's feet are placed in foam booties and the Velcro secured loosely across the arch. The electrosurgical unit is located at the foot of the bed and set to 40/40 blend. This unit also houses the smoke evacuator that is used during the dissection of the fatty and glandular tissues.

POSITIONING AND POSITIONING AIDS

The patient is placed supine on a reversed surgical bed. The patient's gown is reversed and a bair hugger drape is taped to the gown and to the edges of the table. This draping technique is used to prevent an adverse adhesive reaction of the skin. The dispersive electrode for the electrosurgical unit is applied to the thigh, avoiding any bony prominences, joints, implants, tattoos or scars. Two safety straps are used to secure the lower extremities to the bed 2 to 4 inches above and below to the knee. Once the patient is induced, her arms are rested comfortably on ratcheted armboards that have been prepared using a 90-degree wedge covered with one egg crate and a towel. This is then secured to the armboards using three bands of surgical tape. The arms are placed in an abducted position to relax the pectoralis muscles during surgery and minimize traction on the brachial plexus. It is crucial that the arms and the padding are tightly secured to the armboards, as the patient will be placed in a sitting position intermittently throughout the procedure. A second egg crate is then placed over the patient's arm, covering from elbow to wrist and a gauze is used to circumvent all the padding. This is then secured with two bands of tape. Special attention is paid to the IV site, ensuring the IV clamps and flanges do not press into the patient's skin once draped. Finally, a pillow is placed under the patient's knees to relieve low back strain.

Once the patient is secured, she is placed in a sitting position by use of the mechanical bed. The surgeon adjusts the shoulders, arms, hips and torso until they feel the patient is sitting straight and level. The patient is returned to the supine position and the surgeon marks the skin using a skin marker and the skin preparation begins.

SKIN PREPARATION AND DRAPING

The patient's skin is prepped beginning at the nipples, extending from the neckline to the level of the iliac crests and down to the table at the sides with an antibacterial soap slightly diluted with sterile water from the back table. A chlorhexidine gluconate/isopropyl alcohol skin preparation can also be used. The axilla is included in the prep. The surgical site is then blotted to remove excess skin preparation solution so the draping can begin. The sur-

geon and the assistant drape off the patient using four blue towels and a large drape that has been cut into thirds. The drape is used to affix the blue towels to the sides and across the midline of the patient. A disposable drape is used to cover the lower half of the patient and is extended over the lower extremities while a top sheet is placed at the neck and secured to two IV poles by the anesthesia provider.

PROCEDURE

The inferior pedicle technique is used for this patient. This technique features both an arterial and venous blood supply for the nipple-areola complex by allowing it to remain attached to the chest wall. Following the removal of the

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requisite quantities of tissue (glandular, adipose, skin), the nipple-areola complex is transposed higher upon the breast hemisphere; thereby the inferior pedicle technique produces an elevated bust and nipple-areola complex with breasts that are proportionate to the woman's body.

Along the incision line, the breast tissues are infiltrated with a local anesthetic with epinephrine to reduce bleeding. Using a sterile skin marking pen pressed into the breast, the new size of the areola is marked. An eschmark is used to provide a temporary tourniquet around the pendulous tissue during the initial incisions. Using a 15 blade on a number 3 knife handle an incision circumscribes the areola, leaving the areola attached to the inferior pedicle. With an Adson forceps with teeth and a number 10 blade, the skin is deepithelialized from the thick flap, as this flap will later be moved superiorly during the breast lift. Clamps are applied to the tails of the removed skin to provide traction during the de-epithelization. The tourniquet is removed and the de-epithelization is completed to the inframammary fold of the breast. The thick pedicle flap is then excised from the peripheral breast tissue with a Teflon bovie tip. Laheys are used to retract the tissues superiorly during the dissection. It is important to maintain anatomical position of the pedicle tissue during resection of the lateral and medial



Before



After



Before



After



Before



After

wedges or the pedicle could become compromised through unintentional undermining. Beginning medially, the first wedge of fatty and glandular tissue is dissected from the body using the electrosurgical unit and removed from the field to be weighed. This process is repeated for the lateral side. Once the two largest flaps are removed, the upper breast flap is elevated off the pectoral fascia and thinned. This tissue is also weighed.

Once the appropriate amount of tissue has been removed for each breast, the upper “keyhole” flaps are approximated at the midline and tacked in place using a 1-0 polypropylene suture. The incision lines are temporarily stapled closed using a skin stapler and the patient is placed in the semi-Fowler sitting position to evaluate



A surgeon performs breast reduction surgery

the new breast size, shape and symmetry. If more tissue is to be removed, the areas are marked and the staples are removed using a Kelly forceps and placed in the lid of a specimen cup to prevent them from being left behind in the wound.

Breast topography and the location of the nipple-areola complexes are unique to each woman. The desirable average measurements are 21 to 23cm distance from sternal notch to nipple and a 5 to 7cm distance from nipple to the inframammary fold.

The breast is reconstructed by rotating the medial and lateral breast tissue from the upper flap and approximating them to the incision at the inframammary fold. The operative site is now copiously irrigated, hemostasis was achieved and a 15F fluted draining tube is placed through

the lateral incision and secured to the patient with a 3-0 suture. Irrigation contains a triple antibiotic solution of bacitracin, gentimycin and kefazolin. The two breasts were definitively checked for size and shape match. The incisions are closed with 4-0 polyglactin 910 suture subcutaneous sutures. Before final closure with a 4-0 poliglecaprone 25 suture, a skin marker is used to create the outline for the opening through which the areola and nipple will be brought up to the surface and secured. The tissue is excised with a 15 blade and handed off the field to be weighed with the other removed tissue. The nipple and areola are brought through the new opening and are secured without undue tension subcutaneously with 4-0 polyglactin 910 suture. The orientation of the nipple has

been previously marked with two marks for the superior portion and one mark for the inferior. Final closure with a 4-0 poliglecaprone 25 suture on a P3 needle is performed in a subcuticular fashion. This procedure is then repeated on the contralateral breast. Final viability of the nipples is checked.

Once all sutures and bulbs for the drains are placed, the drapes are removed and the remaining blood and fluids wiped from the patient. Dressings (5x9”) are placed along the inframammary fold incision and nipple, covered with unfolded gauze and two abdominal pads (one with a “Y” incision for the drain) and secured with the patient’s soft cotton bra. A binder is then placed to secure all dressings.

For this case, the patient was then reversed, extubated and taken to the recovery room in stable condition. All sponge and needle counts were reported as correct at the end of the case.

FREE NIPPLE-GRAFT TECHNIQUE

In this procedure, the nipple is transposed as a tissue graft without a soft tissue pedicle. This is done on women whose breasts require such a large resection of tissue that the vascular pedicle is unreliable. Tobacco smokers and diabetics may also require free nipple grafting. A grafted nipple has little sensitivity and no lactation capabilities. Dressings for the free nipple graft involve a bolster dressing. The dressing is comprised of gauze wrapped around saline soaked gauze and secured above the nipple using 4-0 non-absorbable sutures around the nipple and tied over the dressing.

REDUCTION MAMMOPLASTY

Equipment

- ▲ Padded footrest for modified sitting position
- ▲ Suction
- ▲ Fiber-optic headlight and light source
- ▲ Electrosurgical unit with needle tip and extension tip

Instruments

- ▲ Plastic instrumentation set
- ▲ Basic or minor procedures tray

Supplies

- ▲ Basic pack
- ▲ Basin set
- ▲ Gloves
- ▲ Blades: several #15 scalpel blades
- ▲ Drapes: folded towels and transverse sheet or folded towels and chest drape
- ▲ Suture: surgeon's preference
- ▲ Drains: none of surgeon's preference
- ▲ Dressings: surgeon's preference
- ▲ Drugs: local anesthetic of surgeon's choice, if used
- ▲ Miscellaneous:
 - Sterile skin marking pen with ruler
 - Syringes: Luer-lok control with 25- or 27-gauge needles, bulb syringe
 - Suction tubing
 - Elastic bandage
 - Skin staples and staple remover
 - Medical scale (for weighing breast tissue)
 - Laparotomy sponges
 - Areolar template

- Liposuction supplies (if requested – reduction only)
- Banked blood (if requested)
- Autotransfusion system (available)

Operative Preparation

- ▲ Anesthesia
 - general
- ▲ Position
 - Patient is supine, with each arm abducted to a 90-degree angle on a padded armboard
- ▲ Prep
 - Chest and breast: The area from the chin to the hips and the entire width of the patient is prepped, including the axillae
- ▲ Draping
 - The drapes are applied to expose the entire chest and may be secured with skin staples

Practical Considerations

- ▲ The intended incision lines and landmarks are marked with a skin marking pen with the patient in Fowler's position. This is accomplished to the induction of the anesthesia, possibly before the patient is brought to the operating room.
- ▲ The patient may require a transfusion and may be requested to donate a unit of blood in advance of the procedure.

The nipple is then monitored for blood supply during the days following the procedure.

POST-OPERATIVE CARE

Following the procedure, the patient is instructed to resume normal life activities, avoiding strenuous physical activity, and upper body pulling and pushing. Patients wear a cotton sports bra and will remove dressings in four days. The cotton bra placed during surgery should be worn at all times during the

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first month after surgery and can serve as a comfort measure during the healing phase. Surgical patients may go home the same day or stay the night depending on pain levels and preoperative health. The drainage tubes that were placed bilaterally are removed in the physician office around postoperative day seven. Patients are instructed to watch for progressive, usually unilateral swelling or increasing pain and nausea as these can be symptoms of subcutaneous bleeding. Surgical scars will fade to white and become less noticeable over a 12-month period of time.

COMPLICATIONS

Post-operative complications can include seroma, wound dehiscence, asymmetrical persistence, hematoma and necrosis. The most severe complication is nipple necrosis. Loss of nipple sensation occurs in about 5% of patients. Complications are more readily seen in women who are obese, tobacco smokers and those that require a large-volume resection of the parenchyma.

Mammograms for these patients will become easier as there is less mass to be examined. Scarring from the procedure can cause blurry or cloudy images in MRIs. However, due to the amount of tissue removed, the patient reduces their chances for breast cancer by 20 to 40%.

RESTORING FUNCTION AND SELF-ESTEEM

For these women, even sleeping can be uncomfortable and breathing can be impaired. Women with overly large breasts often have difficulty finding clothing which fits their increased bust line. Many times women with very large breasts often feel self-conscious of their breasts in social situations.

Following reduction surgery, many women are able to return to active lifestyles, purchase clothing off the shelves and engage in activities that would have otherwise caused excruciating pain, numbness, back/neck aches. These activities can include, but are not limited to, running, biking, climbing, cleaning, sitting straight up and traveling. The self-esteem and function gained by breast reduction surgery has not only a lifestyle but a lifetime effect on those affected by macromastia.



ABOUT THE AUTHOR

Leah-Marie Guill, CST, became a surgical technologist after working as a veterinary assistant and fell in love with the surgical procedures and advancements she observed. As well as main-

taining her CST credential, she holds an Associate Degree in Surgical Technology and a Bachelor of Science from the University of Idaho in Physical Education with an emphasis in Biology. She currently works as a private assistant for a plastic surgeon in Boise, Idaho, where she resides with her husband and three-year-old son, Freddie.

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October is National Breast Cancer Awareness Month

The American Cancer Society estimates that 226,870 new cases of invasive breast cancer cases will be diagnosed in 2012. About 63,000 cases of carcinoma in situ will be found and that almost 40,000 women will die this year due to breast cancer. This type of cancer is the second highest cancer among women in the US and is the second leading cause of cancer death in women, behind lung cancer.

The chance of a woman having invasive breast cancer at some point during her life is 1 in 8 and the chance of dying from it is 1 in 36. However, there are also more than 2 million breast cancer survivors today in the US. Earlier detection, better treatment and continuing education about breast cancer has increased the total number of survivors and continues to allow cancer patients to beat the odds.

Although the cause of breast cancer is still undetermined, there are some risk factors that have been linked to the disease.

- **Gender** – A woman is about 100 times more likely to be diagnosed with breast cancer than men.
- **Age** – The risk of this type of cancer increases with age, with 2 out of 3 women who are being diagnosed with breast cancer are 55 or older.
- **Genetics** – About 5% to 10 % percent of breast cancers are believed to be linked through shared genes.
- **Family history** – Women, who have had blood relatives diagnosed with breast cancer, are at double of the risk if a family member was diagnosed with the disease.
- **Personal history of breast cancer** – A woman with breast cancer in one breast is more likely to get a new cancer in the other breast or another part of the same breast.
- **Race** – White women are more likely to get breast cancer than African-American women and Asian, Hispanic and Native American women.

Other risk factors that may play a part in getting breast cancer such as having dense breast tissue, having benign breast problems, having menstrual cycles earlier than 12, having menopause later than 55 and having radiation treatment to the chest area early in life. There also are a number of other factors that haven't been proven to cause breast cancer, but some believe that what a women eats and drinks as well as lack of exercise and certain types of birth control may play a role in increasing a woman's chance of being diagnosed with breast cancer.

ACS, as well as many other organizations, recommends early and often screening to help detect breast cancer. The earlier the cancer is found, the better the treatments have a chance to work. Finding cancer before it starts to cause symptoms is the key to beating the odds. Signs and symptoms include:

- Swelling of the breast
- Skin irritation
- Breast pain
- Nipple pain
- Redness, scaliness or thickening of the nipple or breast skin
- Nipple discharge other than breast milk

Scheduling mammograms, performing breast self-exams and having a doctor perform a clinical breast exam will all help in early detection. Experts advise women to stick to a monthly schedule on self-exams and get in to the routine of checking continually. If you have any of these symptoms, or haven't had an exam in the past couple years, schedule an appointment with your doctor and ask for a complete physical exam, including a clinical breast exam.

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For more information on National Breast Cancer Awareness Month or more information about breast cancer, visit <http://nbcam.org> or <http://www.cancer.org/Cancer/BreastCancer/index?ssSourceSiteId=null>