

Review Article

Reduction Mammoplasty: Review of Mammographic features following Breast reduction surgery

DOI: <https://doi.org/10.47648/zhswwmcj.2022.v0401.06>

*Sharmin A,¹ Rahman MA,² Humayra ZU,³ Khan MA,⁴ Shah R,⁵

Abstract

Reduction mammoplasty is a common aesthetic surgical procedure among all breast non-oncological surgeries. Patients with macromastia and symptoms came for surgery with the aim to remove excess skin, fat, glandular tissue from the breast to create more aesthetically pleasing small breast. Patients also complaint chronic neck, back and shoulder pain, kyphosis, chronic intertrigo in the inframammary folds. They also suffered from limitation of physical activity, problems with large breasts. Following reduction surgery, preoperative symptoms have been shown to be significantly reduced, improve symmetry. But in breast cancer surgical treatment contralateral partial mastectomy or total mastectomy with reconstruction done with Oncological safety and aesthetic outcome. Fibrosis and the scar formation after surgery sometimes give negative effects on the assessment of radiological screenings. Features are found difficult to differentiate between benign and malignant lesions in breast imaging specially Mammography which performed months or years later. An experienced interpreting radiologist also may have difficulty distinguishing between postsurgical changes after reduction mammoplasty and the imaging appearance of malignancy on occasion. So gradually Radiologists must be more experienced to understanding the expected postsurgical imaging and be able to differentiate the benign postoperative changes from suspicious breast pathology.

Keywords: Reduction mammoplasty, mammogram, calcification, fat necrosis

Received on 06.06.2021; **Accepted on** 07.08.2021

Introduction

Macromastia in adolescence is a distressing condition which create Vulnerability and negative body image in female adolescents which also create significant psychosocial stress. There are some social issues such as trouble exercising, poor fitting clothing, and public scrutiny resulting from enlarged breasts size. Reduction Mammoplasty is a surgery to minimize these problems and demand for plastic surgery among these girls has recently increased.¹ Juvenile breast hypertrophy (JBH) is characterized by bilateral or unilateral and disproportionately overgrowth of breasts during the peripubertal period.² There are rare familial incidence and breast imaging (breast ultrasound or MRI) is very important to exclude tumours, but there are certain limitations in imaging facilities in dense breast tissue.³

Reduction mammoplasty is a technique to remove excess skin, glandular tissue, fat, and to provide the patient's desired breast volume (Figure 1,2), symmetry and size. Reduction mammoplasty is an aesthetic procedure but offer to relieve back pain of the patients with remove of excess breast tissue. Oncoplastic techniques have a great

advantage to fill in lumpectomy defects by parenchymal redistribution and remove excess breast tissue. Postoperative imaging demonstrates abnormalities in skin-incision sites, NAC reposition site, and the area of redistribution of parenchyma. After breast reduction, to improve the breast appearance, free nipple grafting was introduced by Thorek and Lexter who describe nipple transposition with variability along with breast reduction in volume. Gland remodeling also necessary to revert contour deformities, prevent scarring and alter deviation of residual breast tissue.⁴ All of surgical changes will affect the postoperative imaging appearance.⁵ Fat necrosis is most commonly found on mammography and characteristic features are round calcifications with lucent centers (oil cysts). Physical examination of breast changes in fat necrosis may have atypical imaging which are indistinguishable from malignancy.⁶ Other changes found in Periareolar dermal calcifications (Figure 3) and areolar thickening related to the repositioned NAC can be seen at imaging.⁵ Surgery involving the breasts can result in architectural distortion from scars and calcifications.^{7,8}

So, The role of mammography in association with plastic surgery of the breasts has been confined to

1. *Afrina Sharmin, Assistant Professor, Department of Surgery, Z. H. Sikder Womens Medical College Hospital, Dhaka
2. Md. Aatur Rahman, Professor, Department of Surgery, Z. H. Sikder Womens Medical College Hospital, Dhaka
3. Zaman Ummay Humayra, Associate Professor, Department of Surgery, East West Medical College Hospital, Dhaka
4. Mostafa Amin Khan, Assistant Professor, Department of Plastic Surgery, National Medical College Hospital, Dhaka
5. Rejwan Shah, Assistant Professor, Department of Surgery, Z. H. Sikder Womens Medical College Hospital, Dhaka

***Address of Correspondence:** Dr. Afrina Sharmin, Assistant Professor, Department of Surgery, Z. H. Sikder Women's Medical College Hospital. Contact no: 01714008081, Email: afrinarimi@gmail.com, Md. Aatur Rahman, Zaman Ummay Humayra, Mostafa Amin Khan, Dr. Rejwan Shah

screen before breast surgery in patients over 35 years old. Reduction mammoplasty is becoming more popular and the radiologists are more likely to encounter mammograms of reduced breasts.⁹ The purpose of a preoperative mammogram is to detect any pathology or definitive disorder of the breast prior to cosmetic surgery so that the imaging related confusion can be resolved before surgery. Mammogram is a baseline tool to detect abnormalities after the reduction mammoplasty surgery. Following surgery, regular follow up with clinical examination and routine mammograms in every 6 to 12 months help to formulate a baseline for the future detection of breast cancer.^{7,9}

Evaluation of mammographic findings

Reduction mammoplasty procedure creates scars, alterations of breast tissue, formation of fibrotic tissue and cause huge architectural distortion. Complications such as skin thickening, new small area of calcifications, hematomas may mimic some newly formed pathologic condition.



Figure 1: Preoperative hugely enlarged breast Photo credit: Afrina Sharmin



Figure 2: Reduction Mammoplasty with Mastopexy Photo credit: Afrina Sharmin

Procedures also required to resect the excess skin, elevate the nipple and excised glandular tissue from the inferior /superior aspect of the breast depend upon the pedicle choice. 10%- 20% of cases, fat necrosis is recorded in breast reduction patients.⁶ Fat necrosis in now a days after reduction is a major clinical concern because most of the time it is difficult to distinguish from malignant lesion on both physical clinical examination and in radiological finding. Fat necrosis results due to aseptic saponification of fat by tissue lipases and blood. These lesions contain serosanguineous fluid, hemorrhagic fluid and oily fat in the same compartment. This is most commonly seen in the inferior portions of the breast and periareolar area due to maximum surgical dissection. Radiologist previously was unfamiliar of imaging such as mammographic, USG findings of breast changes after surgery and fat necrosis which mimicking the feature of malignancy following breast reduction surgery. But recently the suspicious lesions of fat necrosis need needle biopsy and at least 6 months follow up with imaging rather than surgical intervention.⁶

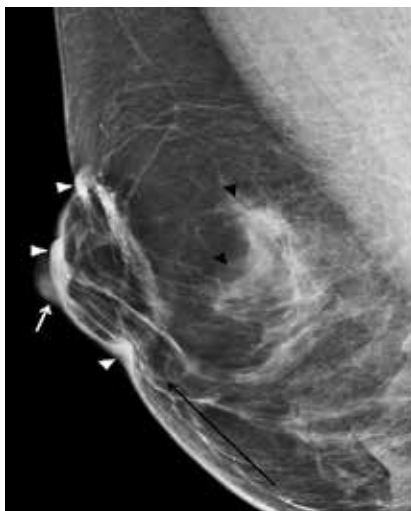


Figure 3: Thickened calcified nipple
Source: <https://link.springer.com/article/10.1007/s12282-013-0494-y>

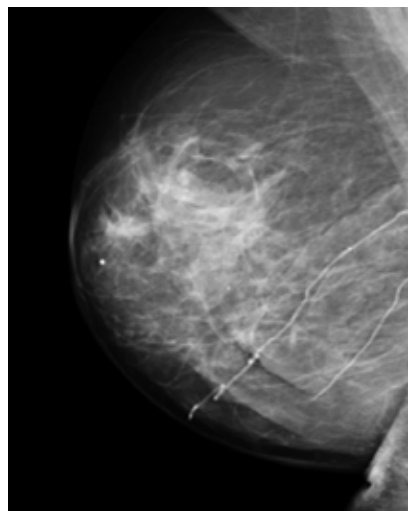
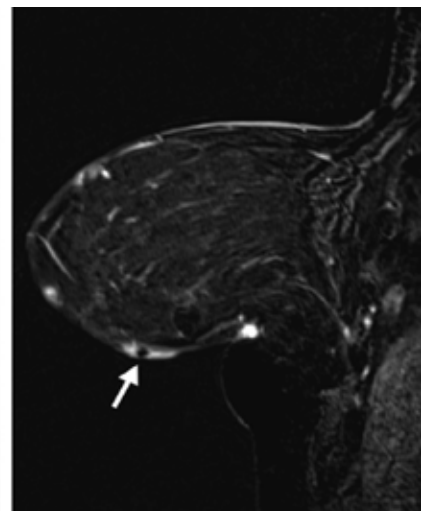


Figure 4,5: Mammographic retroareolar fibrosis and calcification
Source: https://www.researchgate.net/publication/262264233_Update_on_Imaging_of_the_Post-surgical_Breast



Breast reduction techniques usually leave a Wise pattern or traditional inverted-T scar both at inframammary fold and a vertical incision from nipple to downward. Select inferior pedicle and use of vertical incision towards inframammary fold with horizontal line in it give a good scar. After excise the breast tissue as per patients desire and shaping the breast with various parenchymal rearrangement. After reshaping the breast and stitches over the skin around nipple and horizontal incision, the most common changes were keloids along the inframammary fold and dermal calcifications.⁵ Calcifications less than 0.15 mm in the breast and in a small area (1 cm³) in the breast tissue are called Microcalcification. But ≥ 4 in number, irregular, heterogeneous morphology, and are clustered are suspicious.⁹ Similar calcifications following breast reduction surgery is found and enquiry is mandatory if there is spiculated lesion usually in the form of postoperative fat necrosis, scars and radial scars (Figure 4,5). Post-operative benign cases shows the similar features other than breast cancer. So the mammographic changes of scars in Breast reduction surgery were not sufficient on their own to eliminate malignancy and sometimes biopsy were required.⁵

Mammographic Findings at follow-up after reduction mammoplasty

Reduction Mammoplasty surgery exhibited few structural changes such as downward shift of the ductal and fibroglandular tissue and distinctly altered the appearance of normal breast, where most of the ductal and fibroglandular tissue generally is concentrated in the upper outer quadrants. An elevation of the nipple and less skin was above the nipple and more skin was below it.^{9,10} Sonographic finding of fat necrosis is a mass with echogenicity represents internal bands, hyperechoic masses and MRI finding shows wide spectrum of findings of liquefied fat, and fibrosis of breast tissue. The most common appearance is a lipid cyst, oval or round mass.¹¹

Brown et al noted that asymmetric densities were present in approximately half the patients. Parenchymal calcifications were apparent in 50% of patients after 2 years. Miller et al noted that after reduction mammoplasty, all patients are left with a linear scar between the nipple and inframammary fold with skin thickening of the lower breast. Fat necrosis represents as an irregular calcified mass.⁷ Nipple was seen to be directed upward in two cases bilaterally and in three cases unilaterally. Skin thickening of the lower breast was seen in 10 cases and due to vertical scar, that runs between the nipple and inframammary fold. Thickening of the skin of the areola was present in 15 patients and Skin retraction was present in nine cases. Skin thickness of greater than 3 mm was considered abnormal. Two patients had bilateral calcifications; but majority of postsurgical calcifications had a benign appearance.⁹ Abboud et al have reported that breast reduction using

liposuction has been associated with calcifications from fat necrosis. Four out of 42 patients had biopsies for suspicious densities, which were benign on pathology. After liposuction deep intraparenchymal calcifications (5 of 7) were mostly macrocalcifications. There is no confusion with malignant calcifications because less numerous, more scattered and regular. Stereotactic needle biopsy can confirm the diagnosis.⁷ A Case report shows that almost entirely fatty breasts without focal mass or clustered microcalcifications on mammogram taken before the mammoplasty but after surgery an irregular high density with a spiculated margin in the left upper inner quadrant. Ultrasonography-guided core biopsy revealed only aggregates of fat and dense fibrous breast tissue and few inflammatory cells, most of the features suggestive of fat necrosis and there is no evidence of malignant cells^{6,7}. But surprisingly on 6th monthly follow-up ultrasonogram, the lesion decreased in size.^{8,9} CT scan mainly explain inflammation, liquefied fat, fibrosis.¹¹

The mammographic findings after reduction mammoplasty are predictable and retroareolar fibrotic band about 0.5-cm thick and parallel to the skin contour is commonly found. The retroareolar band usually was observed in eight patients and the continuity of only some ducts with the nipple. Transposition of parenchyma to an unusually low position is explained by a relative shift of the nipple. Fat necrosis after reduction mammoplasty, presenting as irregular partially calcified masses.⁹ Neither of the radiologists felt that any of the preoperative mammograms demonstrated confirmed breast malignancies.¹² Architectural distortions and calcification were reported, none were considered significant for malignancy because features are not suggestive, such as clustered microcalcifications or spiculated masses. But Radiologist recommended interval evaluation with repeat mammography at 6 months.¹³ Total of 595 patients were evaluated during the study period. There were 518 procedures (87%) for macromastia and 77 procedures (13%) done for breast symmetry of contralateral breast cancer. Mean age of all patients was 44.6 years. About 9.8% patients shows significant pathologic changes of all patients. Carcinoma was present in 2.4% of all patients, including 2 invasive carcinomas, 6 ductal carcinomas in situ, and 6 lobular carcinomas in situ.^{12,13}

There is a controversy and its surgeon's choice whether they want a preoperative mammogram prior to cosmetic breast surgery on a patient under the age of 40 or not, but it is recommended. It protects the physician if there is future litigation. Patients at any age with a significant family history should have a mammogram before any cosmetic breast surgery is contemplated.^{7,13}

Conclusion

Preoperative mammogram is counted as an important tool which can be used as a guideline to compare the postoperative changes in the breast tissue. It is the screening technique to detect any abnormalities where elective procedure is being performed on a healthy patient. A policy is mandatory to implement this screening tool so that all patients can be protected from a potentially lethal disease by early detection. Several studies have stated that after reduction mammoplasty the changes are benign and malignancy is rare. The reason is linked to the removal of the glandular tissue of the breast that may cause cancer and it has a potential benefit effect. Preoperative, immediate postoperative baseline and interval mammography on all breast reduction patients are required to assess the abnormal pathology and early detection of malignant changes. Though the changes are confusing between benign and malignant but the radiologist becoming more experienced to report this kind of changes as there is an increasing number of cases in day to day practice.

References

1. Wolfswinkel E. M, Lemaine V. Weathers W.M. Hyperplastic Breast Anomalies in the Female Adolescent Breast. *Seminars in Plastic Surgery* 2013; 27(1): 49-55
2. Çakır M , küçükartallar T , Tekin A . Comparison of mammography sensitivity after reduction mammoplasty targeting the glandular and fat tissue. *Ulus Cerrahi Derg* 2015; 31: 68-71
3. Aguiar B. B. Silva R.S. Costa C . Juvenile breast hypertrophy. *Endokrynologia Polska* 2020; 71 (2): 202- 203
4. Wamalwa A O, Stasch T , Nangole F. W, Khainga S.O. Surgical anatomy of reduction mammoplasty: a historical perspective and current concepts. *SAJS* 2017; 55(1) : 22-28
5. Margolis N.E, Morley C , Lotfi P . Update on Imaging of the Post Surgical Breast . *Radiographics*. *rsna.org* 2014; 34(3): 642-660
6. Park Y.M , Kim E.K. Fat Necrosis Simulating Breast Malignancy Following Reduction Mammoplasty: A Case Report ; *J Korean Radiol Soc* 2004;51:573-576
7. Shiffman M.A . Mammograms in cosmetic breast surgery. *Indian J Plast Surg* July-December 2005; 38 (2)
8. Goudreau S.H , Woughter M.A , Seiler S.J . Multimodality Review of Imaging Features Following Breast Reduction Surgery; *Eur J Breast Health* 2021; 17(3): 206-213
9. Miller C.L , Feig S.A , Fox J.W , Mammographic Changes After Reduction Mammoplasty . *AJR* 1987; 149: 35-39
10. Almahariq M. Quinn T.J , Siddiqui Z.A . Breast-Conserving Therapy Including Whole-Breast Irradiation is Associated with Better Overall Survival Compared to Mastectomy Alone in Patients with Early-Stage, Lymph Node-Negative Breast Cancer with High OncotypeDX Recurrence Score: an NCDB Analysis. *International Journal of Radiation Oncology* 2019: 105 :15
11. Kerridge W.D , Kryvenko O.N , Thompson A. Fat Necrosis of the Breast: A Pictorial Review of the Mammographic, Ultrasound, CT, and MRI Findings with Histopathologic Correlation. *Radiology Research and Practice*; 2015 :1-8
12. Ambaye A.B , Goodwin A.J , MacLennan S.E. Recommendations for Pathologic Evaluation of Reduction Mammoplasty Specimens A Prospective Study With Systematic Tissue Sampling. *Arch Pathol Lab Med* 2017; 141: 1523-1528
13. Netscher D , Meade R.A , Friedman J.D . Mammography and Reduction Mammoplasty. *Aesthetic surgery journal* 1999; 19 (6): 445-451