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Breast Reconstruction after Lumpectomy

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Abstract

Apart from function, beast is aesthetically and sexually a very important organ. Reconstruction of breast after breast conservation surgery in cases of malignancy and after benign lumpectomy has to be given due importance and the results are more than often rewarding.

The preoperative considerations, planning, motivation/demotivation, intraoperative techniques of Oncoplastic surgeries and other methods of filling partial mastectomy defects are dealt in this article. Whether simultaneous or delayed reconstruction is preferable is also elaborated. How and whether quality of life is affected with reconstruction is a thought provoking issue and has been discussed.

Keywords: Lumpectomy; Breast conservation; Breast reconstructions; Oncoplastic techniques; Pectoralis major flap; Reduction mammoplasty; Volume replacement; Volume displacement

Introduction

Breast, arguably one of the most important organs, both aesthetically and functionally, is most dreaded when it comes to disease. So much so, that it became a super specialty subject much before many other organs became one. Adding to our trouble surgically is the fact that there are two breasts. As if one was not enough!

Breast reconstruction is an aesthetic procedure and it has to be borne in mind every single time a reconstruction is attempted. Another factor to be borne in mind is the 'feel' of the tissue because of its sexual - emotional component. How far just putting a flap for creating a mound which is of different consistency and is insensate, actually satisfies the patient is a matter of debate [1-3]. Lumpectomy/Mastectomy with or without reconstructions have little bearing on the quality of life of the patient but the Breast Conservation group has slight advantage over the Mastectomy group [4]. The sexual activities in fact decreased in the breast reconstruction group [5]. In some studies the reconstruction group surprisingly had a less than expected benefit on body image and they felt more likely that breast cancer had a negative impact on their sex lives. The fear of recurrence is a parameter which is most important and seems to affect QOL assessment more than the choice of surgery [6-8]. Kalaaji and Bruheim compared TRAM flap, lateral thoracodoral flap and implant reconstruction and found that there were positive effects of reconstruction in physical, social and psychological aspects and about 81% would be comfortable referring the reconstruction procedures to others in similar condition. The results of TRAM was the best followed by LD flap and implant [9]. The fact is that often we do a breast reconstruction without keeping all these objectives in mind, for just creating a mound which resembles a breast. Options which are given to the patient, which includes the option of not to reconstruct immediately, varies from surgeon to surgeon, the healthcare limitations, manpower limitations etc. [13-16]. Recent studies show that delayed reconstructions may be better from Oncology point of view, but delayed reconstructions have a problem of low motivation from the patient's point of view. But other studies have also pointed in different direction regarding the quality of life in immediate *vs.* delayed reconstructions [10-12]. The compliance will definitely improve once we have better to offer in terms of consistency and sensation of the breast and simpler procedures for reconstruction. It is time we start concentrating on these important factors. Some flaps like TRAM and SGAP flap do give better breast like feel than others like LD. The jury is not out as to which is better; reconstruction or not, and various other factors like adjuvant chemotherapy, radiation therapy, age of the patient etc. determine how the patient is going to decide about breast reconstruction [17]. All patients must be individualized and taken into confidence and assessed in an unbiased way before deciding upon the reconstruction.

Although Total breast reconstructions have fancied the minds of Plastic surgeons, probably because of the fascination for technical challenges involved, sadly the partial breast reconstructions especially in the benign settings have been under performed. Why this happens is probably because benign breast lumps are operated by General surgeons, Gynaecologists, Cancer surgeons, Breast

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surgeons and Plastic surgeons. Not all of these groups of surgeons are most aware about the cosmetic aspect and its implications. In contrast to Head and Neck area where even a small defect hinders functionally and aesthetically, in breast, since the functional defect is less, the sexual- emotional factor takes the brunt.

Breast reconstruction to fill partial mastectomy defects or to fill the lumpectomy defects requires simpler but precise techniques. It is very rewarding to the surgeon as well as to the patient. Often it can be made inconspicuous without leaving much stigma of a precious scar. In the scenario that 'Cancer' word is more focused upon, we tend to forget that excision of benign lesions also causes breast deformities and a conscious effort must be made to keep this fact in mind.

Pre surgical planning

It is important to keep some points in mind before the surgery

1. Usually there is a size discrepancy between the two breasts and it can be made to use to our benefit. For e.g. excision of a tumour in a larger breast can modify the breast to match the other breast.

2. Photography of the breasts should be done always; from front, sides and oblique views for objective comparison.

3. Whether the lumpectomy is being done for benign disease or for a malignant disease.

4. Incision for primary excision should be planned in such a way so as to make the scar least visible and if possible, reconstruction to be done from the same incision.

5. Endoscopic resections if possible can hide the scars and minimise the scars, especially in benign diseases.

6. Usually any defect more than 3 cm in diameter will leave some deformity unless very deeply seated. The magnitude of the problem can be understood by this fact that most of the malignant lumpectomies and significant number of benign lumpectomies will require some form of reconstruction.

Concepts for aesthetic reconstruction

1. To understand that Breast is a 3 dimensional structure which has significant mobility.

2. It changes its shape in sitting and supine position.

3. Reconstruction of various quadrants of breasts may require different techniques.

4. Incision planning for lumps in various areas is important.

5. Preferably reconstruct using the same incision.

6. Nipple areola aesthetics is very important

7. Size alteration of areola may make a large surgical defect smaller.

8. To consciously decide if the other breast requires any alteration.

9. Try and preserve the sensation as much as possible by dissecting less in the pathway of the sensory nerves if possible. The sensation of the nipple- areola is both from the anterior and the lateral cutaneous branches of the 2nd to 6th intercostal nerves [18-20]. To preserve the sensation, both the sides should not the extensively dissected (Figure 1,2A and 2B).

There are various incisions to approach the breast lump and the choice of incision depends on the location of the lump, its

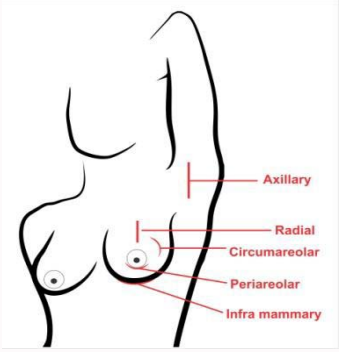


Figure 1: Breast incisions.

Figure 2a: Upper radial incision.

Figure 2b: Upper circumareolar incision.

accessibility from a remote incision, probability of scar stretching and hypertrophic scarring tendency of the patient. A upper Circumareolar scar may stretch more in a very heavy breast because of the pull and a radial scar on the inferior part of the breast may pull the nipple down. Reconstruction techniques for lumpectomy defects/partial mastectomy depends on whether the defect is benign or malignant, the size of the defect, quadrant of breast where the defect is situated, and whether the skin loss is there or not. Cosmesis is not satisfactory in many patients undergoing breast lumpectomy if no primary reconstruction is done at the time of initial surgery [21-23]. When the tumour is malignant, even a small tumour leaves a large 'three dimensional defect'. Considering a 1 to 2cm margin all around, in a breast conservation surgery, a 3 cm tumour excision will mean a defect diameter of 6-7 cm. which by all account is a big defect which is difficult to cosmetically reconstruct using local tissues. In contrast a 3 cm benign tumour will leave a defect of around the same size.

In addition, fearing that the margins may be positive in a malignant tumour, the excision is usually more generous necessitating a non local flap although many oncology surgeons send intra operative multiple frozen sections to be reasonably sure of the cut margins [24-28]. This has an important bearing because if the margin comes positive, the flap also goes waste.

Volume displacement and volume replacement

It is very important to understand the concept of 'Volume of the breast' while we decide the reconstruction. Oncoplastic techniques

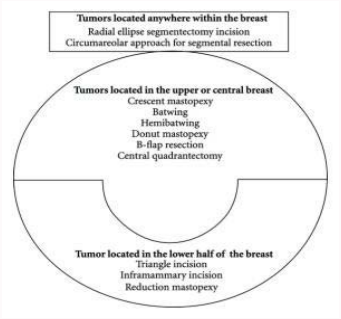


Figure 3a:

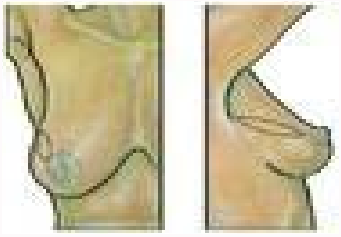


Figure 3b: Radial ellipse segmentectomy for lateral lesions.

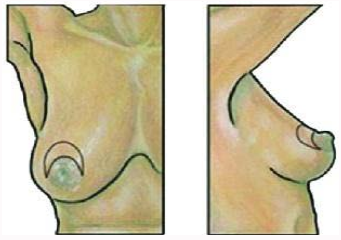
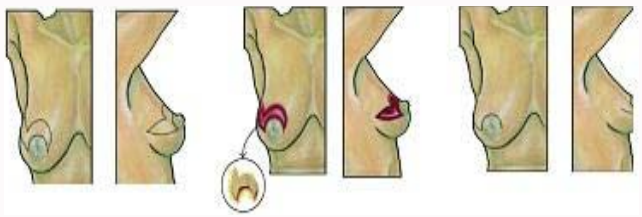


Figure 3c: Cresent Mastopexy for supraareolar lesions.

Figure 3d: Batwing resection.



3e: Hemi batwing resection.

Figure 3f: Donut mastopexy incision for central quadrant deep lesions.

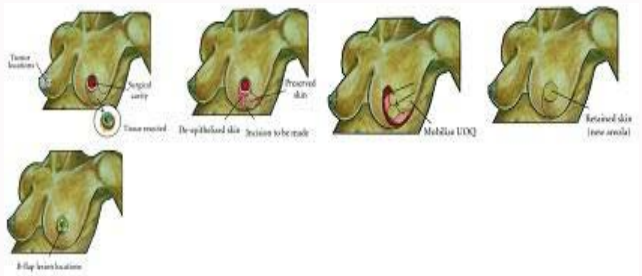


Figure 3g: B flap resection.

can be broadly classified as 'Volume Displacement (rearrangement)' or 'Volume Replacement' techniques.

Whenever there is a lumpectomy in the breast, there is a net loss of volume of the breast. Volume displacement techniques use the local tissues to either close the defect to give a decent looking breast. The principle behind such techniques is that the volume of breast, which is reduced by the tumour excision, is obliterated by borrowing the volume from nearby areas using the principles of plastic surgeries preserving the vascularity of the tissues. The borrowed tissue brings back the volume in the defect at the cost of depleted volume from the borrowed area. Since the borrowed area as generally large compared to the defect, the loss of volume is less appreciated as it is distributed in a larger area. In contrast, a non local flap brings back the excised volume from a distant area. In a deep defect in a large breast such local tissue rearrangement may work better compared to a smaller breast with superficial lump. Radial ellipse segmentectomy, Circumareolar approached segmental resection, Crescent Mastopexy Resection, Batwing Horizontal Resection, Hemi batwing Horizontal Resection, Donut Circumareolar Mastopexy, B-Flap (Grisotti mastopexy) Resection, Triangle Resection, Inframammary Resection are few of the resection approaches through which the adjacent breast gland is mobilized to fill the defect [29,34]. These resection incisions lie over the lesion and have been designed to close the resection incision aesthetically. All these resections usually remove a segment of skin along with the mass and the whole tissue defect is closed in layers. It is important again to reaffirm that the resultant breast becomes smaller in size but since the 3 dimensional volume change is less and is evenly distributed, the appreciation of the deformity is minimized. Skin removal in such cases has 2 roles to play. Firstly, the question of skin margin coming positive is nullified and secondarily if the defect is closed in layers, there will not be an excess skin.

Courtesy International Journal of Breast Cancer Volume 2011 (2011) Oncoplastic Approaches to Breast Conservation Dennis R. Holmes, Wesley Schooler and Robina Smith (Figure 3A-3F).

The other way of volume displacement is to do a reduction mammoplasty of the affected as well as the contralateral side like Superior pedicle breast reduction for cancers in the lower part of the breast and Inferior pedicle breast reduction for cancers above the nipple or in the lower medial or lateral quadrant (Figure 4).

Techniques

Allow to fill by itself: For Smaller defects; don't close the cavity.

Figure 4: Breast reduction along with lumpectomy using both superior and inferior pedicle. The left breast had a huge lipomatous tumour measuring about 10 cms in diameter in the central portion underneath supraareolar part of the breast.

Figure 5: Local tissue rearrangement with glandular flap from the lateral aspect of breast. The incison is superior circumareolar.

Smaller lumps, particularly benign and deep seated can be suitably treated by just leaving the cavity as it is. The cavity fills with seroma which gradually gets organised. The defects typically suited for this is a defect of less than 3 cm which are deep seated. The size of the breast and consistency may have a bearing. Larger breast and firmer younger breast is of advantage.

Local tissue arrangement: Local tissue arrangement by mobilising the surrounding breast can to an extent make a bigger cavity smaller, which can fill by seroma, or at times even to close a deep cavity by oncoplastic techniques. Local glandular flaps with glandular rotation after breast-conserving surgery and the other volume displacement techniques form a part of this important gamut [29] (Figure 5).

Fat filling of the defect: Usually done in a late sitting, fat filling with or without Adipose Derived Stem Cells (ADSC) is becoming more and more popular particularly for benign lesions and for smaller defect. The biggest challenge for fat grafting is that non vascularized fat if filled in a cavity will either re-absorb, or necrose or calcify. This means that fat cannot fill the cavity and should not be used for the same. It can be a adjunct to local tissue rearrangement where partially/totally the cavity is closed and then the fat is injected in the periphery of the sutures and in the base in small multiple linear fashion to add the volume. For the fat to survive it is very important to ensure that very small deposits of fat is injected in between the vascularized tissue to help it vascularize [30,31].

Silicone implant: Silicone implant can be used with a muscle or without a muscle to reconstruct the volume. Usually used for total reconstruction of the breast along with Latissimus dorsi muscle flap, this can also be used for filling large lumpectomy defects particularly when the lump is not very superficial with sufficient surrounding breast tissue. Smaller implant is such a case may be a good choice for benign disease.

In case of malignant tumour where radiation may be required it is better to delay the reconstruction with silicone implant till the radiation is over and the tissue have settled to a reasonable extent because the rate of capsular contracture is significantly high in patients with implants who have got irradiated [32,33].

Pectoralis major muscle flap: Pectoralis major muscle is in the most ideal position for the purpose of breast reconstruction. Situated just under the breast, it can be easily accessed from the breast incision. Its dual blood supply allows one to raise a superiorly based flap based on the Thoraco-Acromian pedicle and a medially based flap based on the perforators of internal mammary artery. The former flap can be rolled over like a ball to fill any lumpectomy defect in the upper quadrant of the breast. The latter flap can be used for filling the defects in the medial part of the breast. Since the breast mount starts from a little below the clavicle, the uppermost portion of the Pectoralis major muscle remains intact and the dissection does not proceed unto the superior most portion of the muscle. It means that the adduction movement at the shoulder joint remains unaffected.

Pectoralis major myofascial flap based on thoraco-acromial pedicle can be harvested from the lumpectomy incision in the same supine position. The flap can be raised till the upper pole of the breast preserving the clavicular head of the muscle. Using micro neural dissection, the nerve fibres to the lower fibres are cut. The muscle flap can then be rolled over itself like a ball and sutured on to itself. The flap can then be fixed to the chest wall as well as to the walls of the cavity to obliterate it. This flap comfortably fills the post-lumpectomy defect of the central and upper outer breast quadrants with a diameter of 3 cm to 6 cm. The intact clavicular head of the Pectoralis Major muscle preserves its function. For medial defects of the breast the flap can be raised on the perforators of the internal mammary artery. The Pectoralis minor muscle can additionally harvested to add further bulk in the upper outer quadrant if need is felt. The pectoral nerve could be preserved by longitudinally dividing the pectoralis minor muscle so as to have two flaps which can be then oriented in different directions to suit the defect if needed [35] (Figure 6). The axillary clearance has been done through the same incision (circumareolar). Courtsey Ann Plast Surg. 2010;65(1):23-7. Use of pectoralis major with or without pectoralis minor muscle flap to fill lumpectomy in the breast. Manaswi A, Mehrotra N.

Circumferential breast mobilisation: This technique is also a volume displacement technique where in the remaining breast is extensively mobilised preserving the medial and lateral vasculature of the breast so as to obliterate the cavity.

Volume replacement techniques: All Flaps which are regional or distant including the free microvascular reconstructions come under the category of Volume replacement techniques. Lattismusdorsi flap, TRAM flap, DIEP flap, SGAP flap, perforator flaps all come under this broad category these flaps may be with skin or without skin paddle.

For partial defects in the breasts, generally free flaps are not considered and the most obvious flaps would be Lattismus dorsi, Pectoralis Major/Minor, Upper abdominal local flaps for inferior quadrant and perforator flap from axilla or back for lateral quadrant. Both Lattismus dorsi flap and pectoralis major flaps can fill the defect in almost any quadrant of the breast. If the defect is small, the pectoralis major may be preferred than Lattismus dorsi because the

Figure 6: The rolled over Pectoralis major muscle flap for upper outer quadrant lesion.

Figure 7: Lattismusdorsi muscle only flap for filling a lateral breast defect. The incision for lumpectomy has been lateral incision extending to the lateral part of inframammary crease.

Figure 8: Lattismusdorsi Myocutaneous flap for lateral sector mastectomy.

morbidity is considerably less in the former, but if the defect is large Lattismus dorsi flap is very versatile [36,37].

Pedicled Perforator flap is another very good option with minimal morbidity particularly when the skin loss is there although de-epithelialised flap can be used for deeper defects as well [38]. Usually used for lateral aspect of the breast, thoraco dorsal perforator based flaps are used. Free TRAM flap and SGAP flaps may have advantage in terms of consistency and feel of the breast is concerned, but the magnitude of a microvascular surgery must be kept in the mind and the benefits must justify the surgery (Figure 7,8).

Endoscopic excision with mobilisation: Endoscopic techniques have the potential to be the future work horse both in terms of remote access minimal scar excisions and reconstructions particularly for benign disease. Endoscopic flap harvest of lattismus dorsi muscle only flap has been used for the same effect successfully [39-41] (Table 1).

Complications

The more extensive the surgery, more the chances of complications. Complications may vary from delayed wound healing to extensive flap necrosis. Complications include wound infection, extensive seroma, hematoma formation, fat necrosis, calcifications, flap necrosis, donor site deformity, donor site complications like hernia in case of reconstruction with abdominal tissues, nerve damage, poor cosmetic results and so on.

Motivation of patients

The most important and debatable point is the communication with the patient. How much inclined the patient is for breast reconstruction depends also on how the reconstruction options are put to the patient. Patients may be fearful for extensive reconstructions which have more incidence of complications than the simpler reconstructions. Generally in the context of lumpectomy, to take the patient in confidence is generally not much difficult because of the simpler procedures involved. The long lasting positive physical and sexual l- emotional aspects do argue for a detailed counselling of the patient.

Primary *vs*. delayed reconstruction

Lot of debate has happened whether primary breast reconstructions be offered to the patient. In case of benign breast lumps, this question is not much valid. But in case of malignant tumour the debate is still on particularly for breast conservation treatment. The biggest concern is positive or very close margin. If a flap is put and the margins come positive necessitating re excision, the flap goes waste. And another flap of a bigger size will be required. Since breast loss does not affect the major functions of the body, patients may often not be inclined enough for reconstruction at a later date. A detailed study of the sexual and emotional aspect of the patient as well as the partner in the long run will throw more light on this subject.

Table 1: Local *vs.* regional flap *vs.* free flap.

	Advantage	Disadvantage
Local flaps (displacement techniques)	Good for small defects to medium sized defects Good cosmesis if carried out properly Good results for circumareolar incisions	Can result in deformed breast if enough mobilisation not done Limitation of the size of the defect
Reduction mammoplasty techniques	Good for large breast	Extensive surgery Patient may not be inclined for bilateral surgeries Scaring
Regional flaps	Good cosmetic results No/minimum donor site deformity in Pectoralis major flap and perforator flap	Donor site deformity in LD Visible scar in the back
Distant/Free flaps	Good cosmeis Good consistency of tissue	Donor site morbidity May be too big a surgery for a partial defect

Conclusion

Breast reconstruction, especially in the setting of breast conservation surgery is an important subject which requires positive approach from both the doctor's and the patient's perspective. A proper counselling session may bring lot of happiness to the patient especially because the magnitude of the reconstructive procedures are not very big.

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