



## The Effects of Mastectomy

Although for many patients a mastectomy alone is the right choice, for some women the thought of living without a breast is unimaginable. The absence of a breast can have significant effects on a woman's body image, feelings of attractiveness, femininity, confidence and self esteem. Living with a breast prosthesis may exacerbate these issues with the added inconvenience and practical problems associated with them.

## Breast Reconstruction

Breast reconstruction allows a woman to:

- feel whole again
- re-establish body symmetry
- eliminates need for external prosthesis
- diminishes anxiety
- increases wardrobe flexibility
- increase feelings of sexual attractiveness

Breast reconstruction, therefore, can play a significant role in a women's physical, emotional and psychological recovery from breast cancer.

## Aims of Breast Reconstruction

To produce a replacement breast:

- with a satisfactory appearance both in and out of clothes
- with the avoidance of an external prosthesis

Either by:

- producing a '**replica**' breast to that which has been lost - matching the contralateral breast in dimension, volume, shape and contour
- or by producing the **best breast possible**(usually smaller and more youthful), with corrective surgery to the contra-lateral breast to produce symmetry of dimension, volume, shape and contour.

## Situations where Breast Reconstruction should not be considered

- When there is progressive metastatic/systemic cancer or significant immediate risk to general health
- when a patient is medically or anaesthetically 'unfit'
- when a patient has significant emotional and psychological barriers to clear informed decision making.
- When there is uncontrolled or advanced local disease affecting the chest wall



### Immediate Reconstruction (at the same time as the mastectomy)

#### Advantages:

- Potential for a single operation and period of hospitalization
- Allows maximum preservation of breast skin (envelope) and preservation of inframammary and lateral folds (**the skin sparing mastectomy**)
- An uplift of the breast skin can be done simultaneously to produce a more youthful reconstructed breast.
- The skin of the breast reconstruction is more likely to be unscarred and free from radiotherapy effects.
- It is often easier to produce a good cosmetic result if skin sparing mastectomy used
- There is likely to be a reduced need for contralateral symmetry surgery

#### Disadvantages:

- Increased operating time (up to 8hrs for some techniques)
- Difficulties with scheduling and co-ordinating surgery

#### Immediate Reconstruction and Radiotherapy:

A proportion of patients undergoing mastectomy will need to have radiotherapy afterwards. Often it is not possible to predict who these patients will be before their mastectomy. Therefore there are some patients who after undergoing an immediate breast reconstruction then need to have radiotherapy to their reconstruction. To some extent all types of reconstructions, whatever technique has been used, will suffer cosmetically as a result of post-operative radiotherapy. My practice is to perform **Sentinel Lymph Node Biopsy** beforehand. This helps to assess the likely need for radiotherapy (see Lymph Node Surgery Leaflet). If radiotherapy after reconstruction is likely, you may wish to consider having your reconstruction delayed until after you have completed all your cancer treatment (see delayed reconstruction). In general:

- implant based reconstructions should be avoided if it can be predicted pre-operatively that there is a strong likelihood of post-operative radiotherapy
- some studies suggest that implant free techniques (Autologous tissue eg. LD flaps) maybe more resistant to the adverse effects of radiotherapy

#### Oncological Safety of Immediate Breast Reconstruction:

There is no good evidence that immediate reconstruction is dangerous; specifically there is:

- **No delay in starting adjuvant chemotherapy.** Although this sort of more complex and involved surgery inevitably carries with it the risk of increased post-operative complications, there is no evidence that it jeopardises the timing of commencement of adjuvant treatments (Wilson and Brown et al 2004).
- **No increased incidence of local recurrence or reduced survival;** when compared with delayed reconstruction or standard mastectomy



### Delayed Reconstruction (mastectomy first, reconstruction later)

#### Advantages:

- Avoids potential delay to commencement of adjuvant treatment
- “Getting all the Cancer treatment over with first”
- Avoids possible detrimental aesthetic effects of radiotherapy or chemotherapy
- Patient satisfaction initially higher (in first twelve months) than in immediate reconstruction. (patients have had chance to experience life with a mastectomy defect)

#### Disadvantages:

- Requires replacement of extra skin lost at initial mastectomy (more complicated techniques or period of tissue/expansion)
- Mastectomy flaps maybe scarred, contracted, thin or irradiated
- An aesthetically pleasing result maybe harder to achieve
- Increased need for contralateral symmetry surgery (to match the other side)
- Patients may not want to put themselves or their family through an extra operation once cancer treatment over
- It is still perceived by many as a ‘cosmetic’ procedure and therefore somehow less important.
- Because the patient does not have cancer, there is likely to be a waiting list to have assessment and surgery.

### Which Reconstruction is best for me?

#### The choice of technique is dependant on:

- Patient fitness for long anaesthesia
- Breast size required
- Body habitus (obesity, high BMI)
- Risk factors for complications (smoking, steroid use, other chronic diseases)
- Laxity & thickness of remaining breast skin
- Availability, condition & quality of ‘spare tissue’ (donor skin, fat and underlying muscles)
- Need for adjuvant radiotherapy (no pure implant techniques)
- Patient preference – if more than one technique feasible



## **The Reconstructive Options**

### **Implant Based Reconstructions**

- One stage – expander/implant
- Two stage – expander first then exchange for permanent implant

### **Latissimus Dorsi Flap - “the Back Flap”**

- Latissimus Dorsi Flap + implant
- Extended or Autologous Latissimus Dorsi Flap (no implant)

### **Lower Abdominal Tissue Transfer – “the Tummy Tuck”**

- TRAM Flap (pedicled)
- TRAM Flap or DIEP Flap (free flap)



### Implant & Expander/Implant Breast Reconstructions

Although this is often considered to be the ‘simplest’ method of breast reconstruction and can be used in both the immediate and delayed setting, it is technically extremely demanding. It is actually very difficult to produce a breast reconstruction that looks exactly the same as the original breast and even harder to ensure a natural and stable long term result.

The Silicone implant is positioned under the pectoralis (chest wall muscle). If there is not sufficient skin or space then the tissues of the new breast may need to be gently stretched (expanded) to produce the final result. Expanders may be empty silicone balloons that are filled with saline (first stage in a 2 stage reconstruction) until the correct volume. Newer composite Expander/Implants (used for 1 stage reconstructions) are roughly ‘half in half’ silicon implants with inner saline chambers; once tissues are stretched and the device full, they can be left in place as the final implant without the need for a second operation.

If an expansion process is needed, it is relatively painless and is usually carried out in the clinic. Expansion is done over several weeks after the initial surgery using saline injections into an access port attached to the device (either under the skin as a remote port or part of the implant itself as an integral port).

### Immediate Reconstruction - One Stage Techniques

New techniques have been developed to produce more natural implant reconstructions in recent years. The implant is still placed under the chest wall muscle, but the lower part of the implant rests on a hammock or sling.

- **Small-Moderate Breasts (little ptosis)**

The lower part of the implant pocket is constructed using a tissue substitute called an **Acellular Dermal Matrix (ADM)**. It is created from specially prepared animal skin ( “Strattice” – from pigs or “Surgimend” from calves) . The chemical processes used to engineer this special material produces a supportive and very soft tissue that has almost the same structure as the human skin. The body does not reject the tissue because it behaves just like the patients own tissues. These materials are used in other branches of surgery for repairing skin and tissues eg hernias, burns etc.

The ADM quickly becomes part of the body’s own natural tissues and gently supports the implant to produce a more natural breast shape. Often there is no need for expansion at all and a permanent implant and the final breast volume can be reconstructed straight away.

- **Moderate –Larger Breasts (with ptosis)**

A larger breast can be reconstructed using an ‘uplift’ technique where the excess lower breast skin can be used inside to form an internal hammock for the implant to rest on. The upper part of the implant is still placed under the pectoral muscle. This technique called “**The Lower Pole Dermal Sling Technique**”, has been pioneered in Cornwall where this is a large experience of producing very natural breast reconstructions that are slightly more uplifted and youthful than the original breasts.



### Delayed Reconstruction - Two Stage Technique

Skin expansion is necessary to replace the skin lost after a mastectomy. The gradual expansion causes stretching of the chest wall tissues as well as recruitment of skin and soft tissue from the upper abdominal wall. Over-expansion is intended to recruit enough slack to provide an impression of natural droop/ ptosis once replaced by a permanent implant.

Replacement with a permanent anatomically shaped implant at the planned second stage operation usually takes place 3-6 months later.

### **Advantages of Implant based Reconstructions:**

- Simple & flexible technique
- The reconstruction uses local tissues with similar colour & texture
- No new scars
- No donor site problems
- Short operation
- Easy detection of local recurrence
- No 'reconstructive bridges' burnt if unsuccessful/sub-optimal result.

### **Disadvantages of Implant based Reconstructions:**

- Inconvenience of expansion process - until satisfactory volume and cosmesis obtained
- Difficult to produce a 'natural' look - ptosis hard to achieve
- Ages poorly compared to contra-lateral breast – will always look 'youthful'
- More likely to require further surgery in the future (maintenance, contralateral symmetry)
- Not suitable if radiotherapy required (immediate) or has already been used (delayed)

### **Suitable if:**

- Patient has a normal BMI
- Patient has or desires small non-ptotic breasts
- Patient has good soft tissue cover and intact pectoralis major muscle
- Patient not fit for more complicated involved autologous tissue reconstructions
- Patients are happy to accept:
  - silicone
  - risk of further surgery
  - risk of implant complications/loss
  - need for contralateral symmetry surgery

### **Not suitable if:**

- Patient has poor quality chest wall tissues – thin, damaged, irradiated.
- Patient has had a radical mastectomy (no underlying pec muscle)
- More than 8cm of skin will be required (expansion not feasible)
- Patient has previously had chest wall radiotherapy



### Notes about Silicone

All available information on silicone has been assessed by the Independent Review Group into the safety of silicone breast implants and the findings have been published in a thorough report in 1998. The main points of the report clearly state that there is:

- No good evidence of an abnormal immune response to silicone
- No good evidence of a link between silicone and any connective tissue disease (such as rheumatoid arthritis) or any other auto-immune diseases.
- A lack of evidence to support the concept of an atypical, silicone-induced connective tissue disease or “silicone poisoning”
- No good evidence of toxic reactions to silicone
- No evidence that children of women with breast implants are at risk of connective tissue disease.

### Useful Websites

- [silicone-review.gov.uk](http://silicone-review.gov.uk);  
<http://www.mhra.gov.uk/home/groups/dtsbi/documents/websiteresources/con2032510.pdf>
- [newton.nap.edu/html/siliconesafety](http://newton.nap.edu/html/siliconesafety);  
<http://www.nap.edu/openbook.php?isbn=0309065321>
- [fda.gov](http://fda.gov); [breastimplantsafety.org](http://breastimplantsafety.org)

*NB: Lifespan of implants Until there is sufficient long term data about the life span of the newer implants in use, any patient receiving an implant or tissue expander should be aware of the possibility that the implant may need to be replaced in the future. There is however no evidence that all implants must be replaced after 10 years.*



### The Latissimus Dorsi Flap Reconstruction

The Latissimus Dorsi myocutaneous flap (LD Flap) is an excellent reconstructive method for producing a larger more ptotic breast. The LD muscle is a large triangular back muscle of variable thickness. Orientation of the skin paddle in the lines of relaxed skin tension usually allows an ample skin harvest with a healthy healing scar that is mostly hidden under the bra strap.

The muscle, skin and fat of the back is kept healthy by blood vessels and nerves that enter it from the axilla (arm pit). All the harvested tissue is passed inside a skin tunnel into the axilla and into the breast area. It is then sculpted and folded into shape to make the breast mound. A silicone implant or tissue expander may be required behind the muscle to produce the extra volume needed to match the other breast. The breast reconstruction is completed by trimming the back skin on top of the muscle into the exact shape required to form a 'patch-work' with the existing skin.

#### Advantages:

- Safe (low flap failure rates of < 1%), reliable and versatile
- Suitable for high risk patients
- Can produce a large volume natural feeling breast

#### Disadvantages:

- There will be a scar on the back which may not be possible to hide under the bra strap
- The back becomes a 'donor site' and may lead to postoperative problems of its own:
  - Seroma formation - up to 80% of patients can have a repeated build up of harmless tissue fluid in the space where the muscle was. This may need to be drained with a needle several times in the first few months after surgery
  - Back skin flap problems or 'necrosis' – in between 5-25% of patients the back skin may not heal well and need prolonged period of dressings and nursing care. This rate maybe higher if there is poor skin quality, excess tension, or the patient is or was a recent smoker.
- There may be a slight colour mismatch of the back skin to the natural surrounding breast skin
- Twitching of the LD muscle may produce movement of the new breast. This is usually not problematic, but occasionally requires a Botox injection to the muscle or a minor operation to divide the nerve in the armpit.



## The Latissimus Dorsi Flap Reconstruction (cont)

### Functional problems

Significant reduction in strength or impairment of the shoulder and back is rare. Within 2-3 months almost all patients are able to perform the activities they did before the operation (including swimming, golf, tennis). The loss of an LD muscle only tends to affect those women who perform specialised leisure activities like rowing, cross country skiing, mountain climbing etc. Most patients manage extremely well without their LD muscle and there appears to be very little functional weakness. To achieve the best recovery of function however does require a well motivated patient and a planned period of exercise and rehabilitation. Additional physiotherapy may be required to restore full shoulder mobility.

### The 'Extended' or Autologous LD Flap

If a patient has significant fatty tissue over the LD muscle then an extended harvest of this fat may be possible leaving a healthy fatty layer over the entire muscle. The volume of such a flap may be enough to avoid the use of an implant. This technique is therefore especially useful in situations where there may be a need for future radiotherapy (Studies have shown that this type of flap may actually suffer less from the effects of radiotherapy than other reconstruction techniques.)

Implant free autologous reconstruction may be augmented by **fat grafting/lipomodelling** at a later stage for final refinements to volume, contour and symmetry.

Another advantage of this technique is that the flap should theoretically put on weight as the patient does! The extra fat taken for the flap initially leads to an uneven contour of the back but this usually smooths out within a year or so as the patients weight increases. The main drawback of this technique is that there is increased incidence of skin healing problems and seroma on the back. For this reason the technique is not advisable for heavy smokers.

### LD Flap is suitable for:

- Patients who desire a larger, more ptotic breasts
- Patients who wish to avoid surgery to the other breast
- Patients whose chest wall tissues are unsuitable for expansion techniques

### LD Flap is not suitable if:

- There are previous chest scars - thoracotomy
- There has been previous damage to the LD muscle or its nerve/blood supply during previous surgery
- There is no LD muscle – very rare indeed (Poland's syndrome)
- The patient is not fit or unwilling to undergo a 4-6hr operation



### Lower Abdominal Tissue Transfer Breast Reconstruction

The lower abdomen is often a good source of tissue for autologous (implant free) reconstruction. A sizeable and natural feeling breast mound can be created without the need for implant or expander. The tissue harvested is the same as that discarded after abdominoplasty (“tummy tuck”) and produces similar abdominal scarring and a new belly button position (umbilicoplasty).

#### **Suitable for:**

- Immediate and delayed breast reconstruction
- Bilateral breast reconstruction
- Young, athletic patient
- Very committed and motivated patients
- Patients that are unsuitable for implants and when an LD flap is not an option (eg. Absent or damaged muscle or shoulder function should not be risked.
- Revisional surgery if there have been previous complications.

#### **Not suitable for:**

- Patients that are
  - physiologically old (skin, small vessels, cardio respiratory problems)
  - obese (BMI > 30)
  - smoking
- Patients that have
  - diabetes
  - autoimmune disease
  - vasospastic disorders
  - had long term steroids
  - psychosocial problems (unstable emotionally, personality disorder, poor motivation, poor support for recovery, substance misuse)
- Patients that have
  - Abdominal scars disrupting vascular anatomy
  - had radiotherapy to recipient vessels (axilla) or abdominal apron (pelvic radiotherapy)
  - Locally advanced disease

There are several techniques for using the abdominal tissues for breast reconstruction:

- **TRAM flap – pedicled**  
(performed by Mr Brown)
- **Muscle Sparing TRAM flap or DIEP Flap – free flap**  
(performed by Plastic Surgeons only – requires special microscope techniques and a plastic surgical facility for post-operative care)



### The Pedicled TRAM flap

The lower abdominal tissue is supplied by the blood vessel that enters the upper part of the rectus abdominis muscle (the deep superior epigastric vessel). The muscle must be folded/rotated up through a subcutaneous tunnel to reach the mastectomy defect. Usually the contralateral muscle is used so that the tissue flap can sit comfortably in its new position.

#### **Advantages:**

- Produces a large volume, natural feeling breast reconstruction
- Less likely to need surgery to the other breast
- The whole operation can be done without having to reposition the patient.
- There is no need to connect the blood vessels of the flap to the blood vessels of the axilla to keep the abdominal tissues alive (no micro-vascular anastomosis)
- Within repertoire of most Oncoplastic Breast Surgeons

#### **Disadvantages**

- Patients must be very fit and well motivated for their post-operative recovery and rehabilitation.
- Not available to patients who smoke
- Long anaesthetic time
- Longest recovery time
- Long abdominal scar that may have healing problems
- Repositioning of belly button with risk of healing problems

#### **Possible Flap Problems**

Because the upper blood vessel to the rectus muscle can sometimes be small (and it needs to be folded to reach the new position), there can be problems with the flap getting enough blood to stay healthy. Although rare for the flap not to survive (<5%) there may be some parts of the flap that shrink inside (fat necrosis). Usually this does not lead to a dramatic change in the breast shape but theoretically it can. To avoid this very careful ultrasound blood flow tests are performed both before and during the operation.

It may be advised by your surgeon to 'super-charge' the blood supply to your abdominal tissues by performing a special key-hole (laparoscopic) operation 4-6 weeks before your reconstruction. This operation involves diverting the blood flow from the lower blood vessels supplying the abdominal tissue with surgical clips. The abdominal tissue then receives a better blood supply from the upper blood vessels.



### **Abdominal Wall Problems:**

Half of the rectus muscle is lost in a pedicled TRAM flap. This leads to a potentially reduced abdominal wall strength. This can usually be regained by good post-op physiotherapy and exercise programmes. It does mean that this type of operation requires the longest recovery time of all reconstruction operations.

Altering the strength of the abdominal wall can lead to different strains on the back. Patients with back pain must be warned that chronic back problems may get worse after this kind of surgery. Other patients with a risk of back problems could theoretically develop them after this operation (unmasking of minor back problems)

There is theoretically a risk of an abdominal hernia or bulge on the side where the muscle has been lost. With modern surgical mesh techniques this complication is uncommon (<5%) and rarely leads to disability or problematic hernias requiring re-operation

### **Free Flaps - the free TRAM and the DIEP flap**

The lower abdominal tissue is transferred either with a segment of rectus muscle (**free TRAM**) or without muscle (**DIEP flap**). The free flap is fed by the blood vessels that enter the lower part of the rectus muscle (the deep inferior epigastric vessels). These are disconnected from the lower abdomen and the whole flap is then “free” to be transferred up to the breast. The blood vessels are then connected to blood vessels in the axilla (arm pit) with tiny stitches (microvascular anastomosis).

### **Advantages:**

- The flap itself, if transferred successfully has a theoretically better chance of staying healthy and keeping its shape and size long term. However there is for whatever reason the flap does not take, or there is a problem with the blood vessel connection (anastomotic problems), then the entire flap can be lost.
- The abdominal wall muscles may not require much repair and theoretically there may be less loss of abdominal strength to recover. Hernias may also be less likely.

### **Disadvantages:**

- Not done in Cornwall
- There are only a few patients fit enough or eligible for this technique.
- Operating times may be even lengthier than other techniques.
- It has the longest post-operative hospital stay and recovery times.
- Because these techniques are so highly specialised, they must be carried out in a specialist plastic surgical unit. Specialist plastic surgery units carry out free flap operations regularly and there is the necessary nursing expertise and facilities for close, specialised post-op monitoring.



### Pre-operative Evaluation for Breast Reconstruction

At your initial consultation, your consultant will discuss with you your reasons for seeking breast reconstruction and learn about your hopes and expectations of the procedure.

Detailed measurements of your breasts and chest wall will be taken and recorded on a special anatomical form that is kept in your notes. In particular any asymmetry of the natural breast, chest or back must be established in order to plan the best possible surgical strategy.

You will be asked to sign a consent form prior to this for medical photography. Medical photographs are an important part of your assessment and treatment. The images taken will not show your face and do not include any other distinguishing features. They are an essential record of your assessment and post-operative progress and are stored on a secure password protected hospital computer on a further password protected database/file.

Your surgeon should be able to demonstrate to you realistically what he/she hopes to achieve. This will involve a combination of drawing on your skin with a washable marker in front of a mirror and also taking some digital photographs.

### Post-operative advice

You will be encouraged to move your arms as soon as possible to prevent stiffness. However you should avoid raising your arms above shoulder height and avoid heavy lifting at least until your surgeon is happy for you to do so.

A sports bra without under-wire should be worn as soon as possible after surgery and can be worn over the foam tapes. Your dressings will have done their job by 10 days. Your sports bra should be worn 24/7 for at least 4-6 weeks

You should expect your breast/breasts to be bruised and slightly swollen in the immediate post op period. Firm support will help to minimise this and any discomfort. Simple regular pain killers may also be required for the first 1-2 weeks.

When you are seen at your review clinic appointment any remaining dressings will be removed. Your surgeon will check the healing process and for any signs of infection. Your surgeon will advise you when it is safe to resume normal activities – usually 6-8 weeks after your operation.

Keeping the scars taped with a thin strip of low allergy tape such as Micropore™, for 3-9 months can help reduce stretching of the scar whilst it matures, and hence help to keep it as imperceptible as possible. If you have a tendency to form thickened or raised scars there are silicone gels that can be used which might be beneficial

*NB: Remember the final cosmetic result may take several months to achieve. There is a typical 3-6 month period needed for the new breast to “settle in” and reach a steady shape and appearance. Nipple reconstruction is usually not carried out until both you and your surgeon are happy that the optimal size and shape of the breast has been achieved. (see other info leaflet on nipple areolar reconstruction)*



### Notes about Smoking & Breast Reconstruction

It is important that you try to **completely** stop smoking before undergoing any form of reconstructive breast surgery. Although rarely possible the ideal time would be at least 6-weeks before surgery and for at least 6-weeks after surgery (although this would be a good reason never to start again!). The blood supply to healing tissues is reduced in smokers and severely reduced whilst smoking and for several hours afterwards. Poor blood supply may lead to tissue necrosis (death of tissue) at vulnerable sites in the operated breast, particularly the skin.

There is therefore an increased risk of delayed wound healing, serious infection, loss of breast tissue or loss of some or even the entire nipple areolar complex (if the nipple is preserved).

Wound healing problems can lead to a prolonged recovery period with dressings. In immediate reconstruction the worst scenarios could lead to a delay in the start of your chemotherapy or radiotherapy treatments. In severe cases there may even be a need to have further surgery.

Although these complications are rare (and can occur in non-smokers) they are 2 -3 times more likely in smokers. If you stop smoking, then you will greatly increase your chances of a smooth recovery and a good result. Your surgeon may not be keen to list you for surgery if you are a smoker and you should think carefully about stopping and improving your risk of a serious complication.

#### *Note:*

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**Breast Reconstruction – Timings Comparison**

	<i>Operating Time</i>	<i>In Patient Stay</i>	<i>Recovery Time (Back to full function)</i>
<i>Implant Reconstruction</i>	<i>2-3 hrs</i>	<i>3-5 days</i>	<i>6 weeks</i>
<i>LD Flap Reconstructions</i>	<i>4-6hrs</i>	<i>5-7 days</i>	<i>3-6 months</i>
<i>Abdominal Flap Reconstructions</i>	<i>6-8hrs</i>	<i>5-7 days</i>	<i>6-12 months</i>

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