CANADIAN COLLABORATION ON BREAST RECONSTRUCTION

Breast Reconstruction: Patient Information Document

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STANDARDIZED BREAST
RECONSTRUCTION PATIENT INFORMATION

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GLOSSARY

Abscess – Cavity filled with pus and bacteria caused by infection.
Asymmetry – Differences in each breast that can be seen visually.
Autologous – Tissue from your own body.
Bilateral – Refers to both sides, or both breasts.
Biopsy – Tissue sample sent for diagnosis by a pathologist.
Breast Implant – A manufactured filler used to create volume in a breast. This can be filled with silicone or saline.
Cancer – Cells originally from normal tissue that have grown out of control.
Capsular contracture – Tightening of the scar capsule around an implant, which may distort the shape of the breast and cause discomfort.
Capsule – Scar surrounding an implant.
Contralateral – Opposite side. For example, in right sided breast cancer, the left side is contralateral.
DCIS (ductal carcinoma in-situ) – Non-invasive, abnormal pre-cancer cells within the breast originating from the breast ducts.
Fat Necrosis – Death of fat cells caused by lack of blood flow. This creates a hard lump under the skin of the reconstructed breast.
Hematoma – A collection of blood trapped in a cavity as a result of a bleeding vessel.
Hypertrophic scar – Scar tissue that is raised beyond what is normal.
Infiltrating ductal carcinoma – Most common type of breast cancer. Cancer cells originate in the ducts of the breast.
Infiltrating lobular carcinoma – Second most common type of breast cancer. Cancer cells originate in the breast lobules.
In-situ – Pre-cancer that is contained within its tissue barrier.
Invasive – Cancer had grown beyond its tissue barrier, giving it the potential to spread.
Ipsilateral – Refers to a location on the same side. For example, for a right-side breast reconstruction, the patient's *right* side is ipsilateral.
Keloid scar – Scar tissue that extends beyond its boundaries, becoming raised and usually itchy.
LCIS (lobular carcinoma in-situ) – Non-invasive, abnormal cells, originating from the breast lobule. This is not a pre-cancer, but indicates a risk of future cancer development.
Local anaesthesia – Administration of anaesthesia to an area where "freezing" is desired. This is most effective using an injection with a needle.
Malposition – The undesired placement of a breast implant.
Metastatic – Cancer spread from its original site to other sites, for example lymph nodes or other organs.
Pedicled flap – A flap that moves tissue from one site to another, while remaining connected to the patient at all times.
Prophylactic – Action taken to reduce the chance of having cancer (as in a "prophylactic" mastectomy on the unaffected breast).
Prosthesis – An artificial device used to replace a real body part.
Seroma – A collection of fluid that develops in a cavity.
Saline – Salt-water solution containing 0.9% sodium chloride.
Tumour – Latin origin for "swelling". This refers to any abnormal growth of tissue.
Unilateral – Referring to one side, or one breast.

BREAST RECONSTRUCTION HEALTHCARE TEAM

Breast reconstruction is an option available to most women who have had breast cancer surgery. It is also an option for women who have had preventive breast removal. Breast reconstruction surgery can be done at the same time as the mastectomy or at a later time.

Breast reconstructive surgeons work with the cancer care team with an aim to restore your normal body shape and quality of life. Cancer care will not change, and the team's most important goal is for you to be cancer free.

There are a limited number of centers in Canada that offer this service. You may have to travel far from home to have this surgery. Often, there are long waiting lists. The cost is covered by your provincial health insurance.

Breast reconstruction requires teamwork with many health care workers.

Members of this team include:

Breast cancer resection surgeon	This surgeon operates on the breast to remove the cancer and some normal breast tissue that is around the cancer, for example, a mastectomy or lumpectomy.
Pathologist	This doctor uses a microscope to see what your cancer looks like. The pathologist will tell the team what type of breast cancer you have. He will also tell them the size and if it has spread to the lymph nodes. The team needs this information to decide how to treat your cancer.
Medical oncologist	This doctor is the expert on treating cancer with chemotherapy, biologic or hormone therapy. The oncologist will decide whether you need this type of therapy.
Radiation oncologist	This doctor is the expert on treating cancer with radiotherapy. The radiation oncologist will decide if you need this type of therapy.
Breast reconstructive surgeon	This surgeon is an expert in plastic surgery. To rebuild your breast, this surgeon may use implants, your own body tissue (skin, fat & muscle) or both.
Clinical nurse educator	This nurse teaches you about what to expect after the surgery. In some centers, they will talk to you about the different surgery options and their risks/benefits.
Hospital staff, nurses	The hospital staff and nurses work with the doctors to care for you and monitor your progress while you are in hospital. They will teach you how to take care of yourself when you go home.
Family doctor	Communication between your family doctor and the team is very important. Your doctor will monitor your overall health, your recovery from surgery and the status of your cancer.

WHERE ARE YOU IN YOUR CARE?

1) Diagnosis of cancer and treatment
The diagnosis of breast cancer starts a pathway for treatment to remove all the cancer. Almost all women will need a combination of chemotherapy, radiotherapy, surgery, hormonal or biologic therapy. At this point, you may be thinking about breast reconstruction surgery.

2) Appointment with a breast reconstruction surgeon
This may take place before or after the mastectomy. The surgeon will talk to you about the different surgical and non-surgical options. The best option and time for you to have the surgery will depend on several factors. Your lifestyle, cancer size, need for other treatments and treatment preferences need to be considered. The surgeon will talk to you about all of these. Above all, the top priority is making sure your treatment plan will give you the best chance of being cancer free.

TIMING OF YOUR BREAST RECONSTRUCTION OPTION

Breast reconstruction can be done at the **same time (immediate)** as the mastectomy or at a **later time (delayed)**.

Immediate breast reconstruction may have a psychological benefit, as you will not have a period of time with "no breasts". A lot of organization is needed to have this done at the same time as the mastectomy. Because of this, only a limited number of breast centers are able to offer this service. The following are examples of situations that may be considered for immediate reconstruction:

- Low chance of needing radiotherapy after surgery.
- Smaller tumor size (example: less than 2 cm).
- Diagnosis of a non-invasive cancer or pre-cancer (DCIS).
- Diagnosis of a non-inflammatory, non-locally advanced cancer.
- Lymph nodes in your armpit (axillary lymph nodes) do not have cancer.
- Likely to obtain clear margins.
- You are well enough to have a general anesthetic.
- Preventive mastectomy.

Delayed reconstruction is done after the mastectomy has healed. This can be done months or even years after the mastectomy. Most breast centers offer this service. The following are examples of conditions that may be considered for delayed reconstruction:

- You are tumor-free and treatment of your breast cancer (chemotherapy, radiotherapy) is finished.
- You are well enough to have a general anesthetic.
- Radiotherapy has been completed at least 6 months prior to surgery.

WHAT IF I ONLY HAD A PARTIAL BREAST DEFECT?

The main goal of breast reconstruction is to create a breast that looks nice and matches the other one.

A breast lift or breast reduction can be done to correct the shape and size of the other breast to help match the partially removed breast.

A breast lift, a breast reduction, an implant or flap tissue can also be used in women who had only a part of their breast removed (lumpectomy, partial mastectomy) to improve the shape of the partial breast defect.

No partial breast defect is the same, every single one needs to be evaluated on a individual basis by a surgeon close to you.

WHAT IF I HAD BOTH BREASTS REMOVED?

Sometimes women had cancer in both breasts or want the other breast removed to reduce the risk of getting another cancer. The options for reconstructing a breast after preventive mastectomy are the same ones described above.

Reasons for removal of the other side:

- Breast cancer gene carriers contain types of breast cancer which are known to occur in both breasts.
- Strong family history of breast cancer.
- The original cancer was not found by mammograms or other tests.
- Woman's decision after careful consideration of her breast cancer risk.

Pros:

- Easier to have both sides look the same (Symmetry)
- One surgery and hospital stay
- Lower chance of getting breast cancer

Cons:

- For abdominal flaps: only ½ the abdominal tissue can be used for each breast. Implants, tissue expanders, or back tissue may be needed to make the breast the right size
- Longer surgery compared to one breast
- Higher complication rates

WHAT ARE YOUR BREAST RECONSTRUCTION OPTIONS?

There are non-surgical and surgical options that recreate the breast shape. These are covered in the next section in the following order:

Section 1 – Non-Surgical Options
The use of breast prostheses or breast forms.

Section 2 – Surgical Options
Three main techniques are used:

a. Use of implants
The implant is placed in a pocket that is made between the chest muscle (pectoralis major) and the rib. The cut (incision) to make the pocket is done through the scar from the mastectomy. The muscle and skin are closed and allowed to heal for 2- 3 weeks. Implant based reconstruction can be done in a single stage (one surgery under a general anesthetic) or in two stages (two surgeries under a general anesthetic).

b. Use of implants and your own skin, fat and muscle (autologous tissue)
If you have had radiotherapy to your chest, your skin may not be able to heal or stretch as well as it used to. Putting a cushion between the implant and the damaged skin can make the implant surgery safer. Healthy skin, fat and muscle can be taken from your back to make this cushion. (Figure 3) This may help reduce scar tissue from growing around the implant. An implant may not be needed if there is enough skin and fat to make the breast mound.

c. Use of just your own skin, fat and muscle (autologous tissue)
This reconstruction surgery uses only your own body tissues to help build a new breast. Tissues from the tummy area (abdomen) are often used in this surgery. There is usually extra skin and fat in this area that can be used. In most situations, this type of surgery can be done without using implants.

SECTION 1: NON-SURGICAL

External Breast Prosthesis or Breast Forms

Even though this is not a "true" reconstruction option, it is a simple alternative if you do not wish to have surgery. There are many different types and styles to choose from. The breast form may be built into a special bra or can be custom made to fit into a regular bra. Partial breast forms can be used to fill the space after a lumpectomy/partial mastectomy.

Breast forms may be used if you:
- Have serious health problems and are not healthy enough for surgery.
- Are still having cancer treatment.
- Do not want to have surgery.

When is it not used:
- If your skin does not react well to the external prosthesis.

Pros:
- No risk of problems from a general anesthetic or surgery
- No extra scars
- Easy to use and take care of

Cons:
- No natural tissue or breast mound
- Need to hide under clothing and may slip out
- May limit clothing choice
- May feel bulky and heavy
- Uncomfortable and hot in warmer temperatures
- Costs a few hundred dollars and is only partially covered by government programs

FAQs

Where can I get one?
Contact your local Breast Cancer Support Network or your Regional Breast Cancer Action group. They can put you in contact.

SECTION 2: SURGICAL OPTIONS

a. Implant-based Reconstruction

The implant is placed in a pocket that is made between the chest muscle (pectoralis major) and the rib. The cut (incision) to make the pocket is done through the scar from the mastectomy. The muscle and skin are closed and allowed to heal for 2- 3 weeks. Implant based reconstruction can be done in a single stage (one surgery under a general anesthetic) or in two stages (two surgeries under a general anesthetic).

Breast implants may be used:
- In one sided (unilateral) or two sided (bilateral) breast reconstruction.
- If there is not enough extra skin, fat and muscle available from your own body. (autologous tissue)
- If an implant matches the other breast well.
- If you have health problems where shorter surgery times are safer.
- If this is what you want.

Breast implants are generally not used:
- If there is too little or very thin skin after the mastectomy.
- If radiotherapy has been used in the area. Breast implants have been used in areas that had radiation but this has a higher risk of complications.
- If you are not healthy enough for surgery.
- In smokers who do not heal very well.

Pros:
- Straightforward and simple
- Short surgery: about 1 hour
- No new scars

- No overnight stay in hospital
- Within certain limits, you can choose your new breast size
- If the implant fails, there are other options
- Short recovery time – about 3 weeks

Cons:
- Scar tissue around the implant (Capsular contracture): The body may react to the implant. This can cause scarring, deformity, and pain
- Implant size does not change if you gain or lose weight
- Implant problems - leaks or breaks
- Balancing surgery on the other breast (breast lift, breast reduction) is often needed to match the side of the implant
- **Note:** Government health programs cover the cost
- Rippling effect may be seen through thin skin
- Does not look or feel the same as your own natural breast

TYPES OF IMPLANTS – the "saline implant" and the "silicone gel" implant. Both types have an outside shell made from silicone. Silicone is a soft material that feels like a "gummy-bear".

Saline Implant:
This implant's shape comes from being filled with a salt-water solution (saline). It comes in two forms:
1) Ready- made in many sizes and shapes and cannot be adjusted once it is placed in the body
2) Adjustable "expander-implant". It can also have a round injection port attached to the implant or the port can be built right into the implant. The size can be adjusted. The port is used to fill the implant with a small amount of saline. Each time it is filled, the implant gets a little bigger. This type of implant is also called an "expander". It is used if the pocket needs to be made bigger or stretched.

Pros:
- Can easily see if there is a break or tear. The size of the breast gets smaller right away
- If it breaks, the saltwater solution is absorbed by the body
- Less expensive

Cons:
- Feels less natural.
- "Rippling" effect may be seen through the skin
- Some women notice a "sloshing" feeling

Silicone Gel Implant:
This implant gets its shape from a silicone gel filling. The size or shape cannot be changed.

Pros:
- Feels softer and more natural
- Less "rippling" effect
- A small break will not always need to be fixed by surgery

Cons:
- Cannot easily see if there is a break or tear. The filling is a gel that feels like a “gummy-bear”. It will not empty quickly like salt-water solution does. The size of the breast does not change right away
- Possible increased risk of scarring around implant (capsular contracture)

THE IMPLANTS CAN BE USED IN TWO DIFFERENT WAYS

I) Single stage implant reconstruction (See Figure 1)

This is done in one surgery under a general anesthetic.

1) Implant that can change in size after surgery (Figure 1)

A saline “expander-implant” with a small port attached is placed in the pocket. Every week after surgery, the port is used to fill the implant with a small amount of saline. This is done over the next few months in the clinic. This allows the pocket to slowly stretch and get larger over time. This will continue until the pocket is a little larger than the ideal size. Saline will then be drawn out through the port until the right size is reached. The port is then taken out through the original breast scar. The implant is left in place and is now permanent. This is done in the clinic under a local anesthetic.

Pros:
- One surgery under a general anesthetic
- Can be done with larger breast sizes
- When the implant is being adjusted, you can decide on final size

Cons:
- Clinic visits every week for a few months
- Small surgery with local freezing is needed to remove the port. May leave a second scar
- The chance that the implant moves out of position is higher

2) Non-adjustable implant

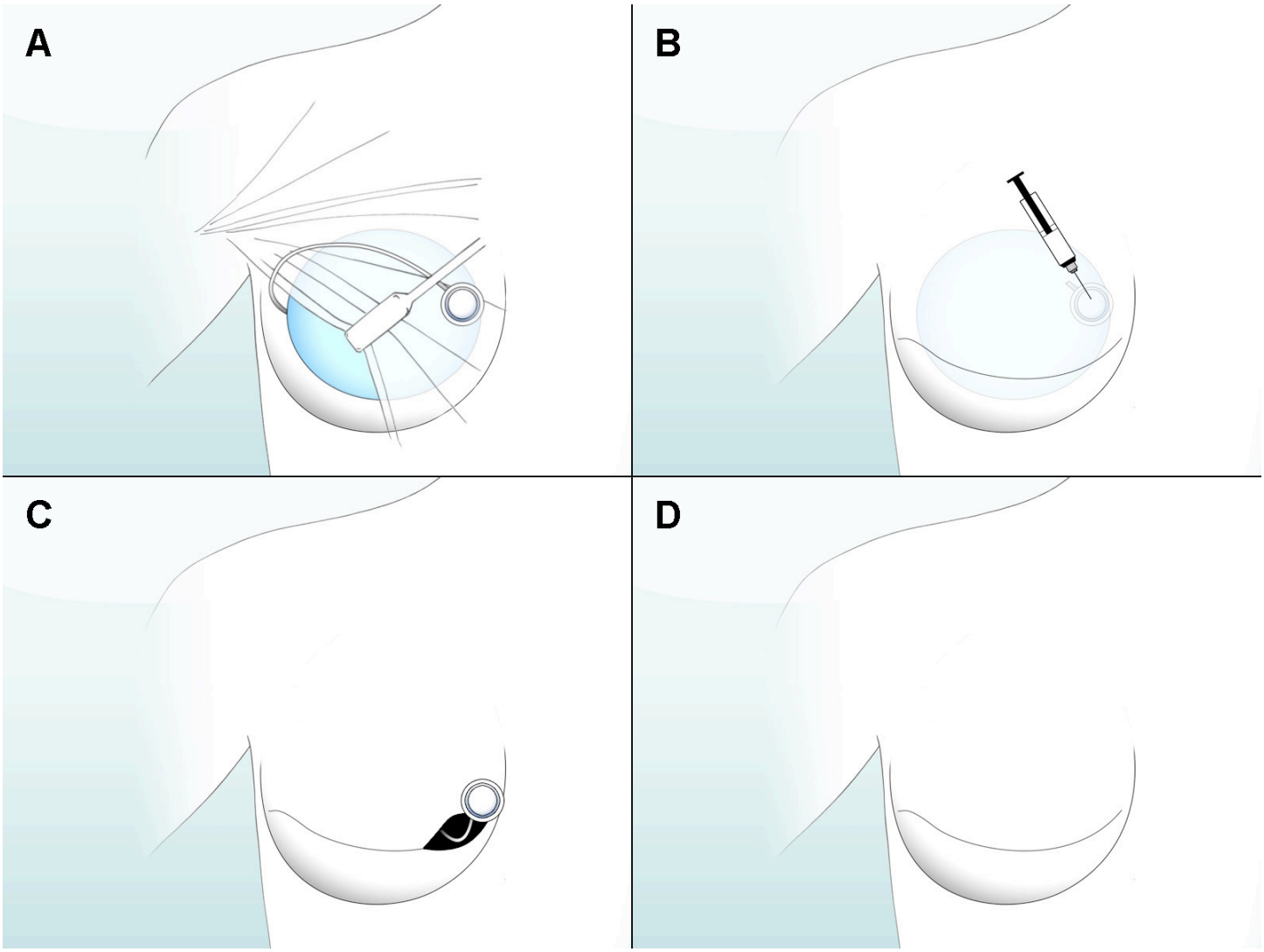
Before the surgery, the size of the implant is picked to match the size of the pocket. The volume of the implant cannot be adjusted once it is put in the pocket. This will be the permanent implant.

Pros:
- One surgery under general anesthetic
- Do not have to return every week to expand the implant

Cons:
- Final breast size limited by the pocket size and how tight the skin is
- The chance of the implant moving out of position is higher
- Rate of problems with wound healing may be higher

Figure 1. The single stage implant reconstruction.

(A) A pocket is made in between the chest muscle (pectoralis major) and the rib. The saline implant with an attached port (expander) is placed in the pocket
(B) The port is easy to find and is used to fill the implant with saline
(C) Once the implant has reached the right size, the port is removed through part of the original scar
(D) The final shape of the breast is done



II) Two-stage tissue expander/implant reconstruction (See Figure 2)

Two surgeries under a general anesthetic are needed.

In the first surgery, a “saline implant” with a small injection port built into it is placed in the pocket. This is called an “expander”. Every week after surgery, the port is used to fill the implant with a small amount of saline. This is done over the next few months in the clinic. This allows the pocket to slowly stretch and get larger over time. This will continue until the pocket is a little larger than the ideal size. This implant will stay in place for at least 1-6 months.

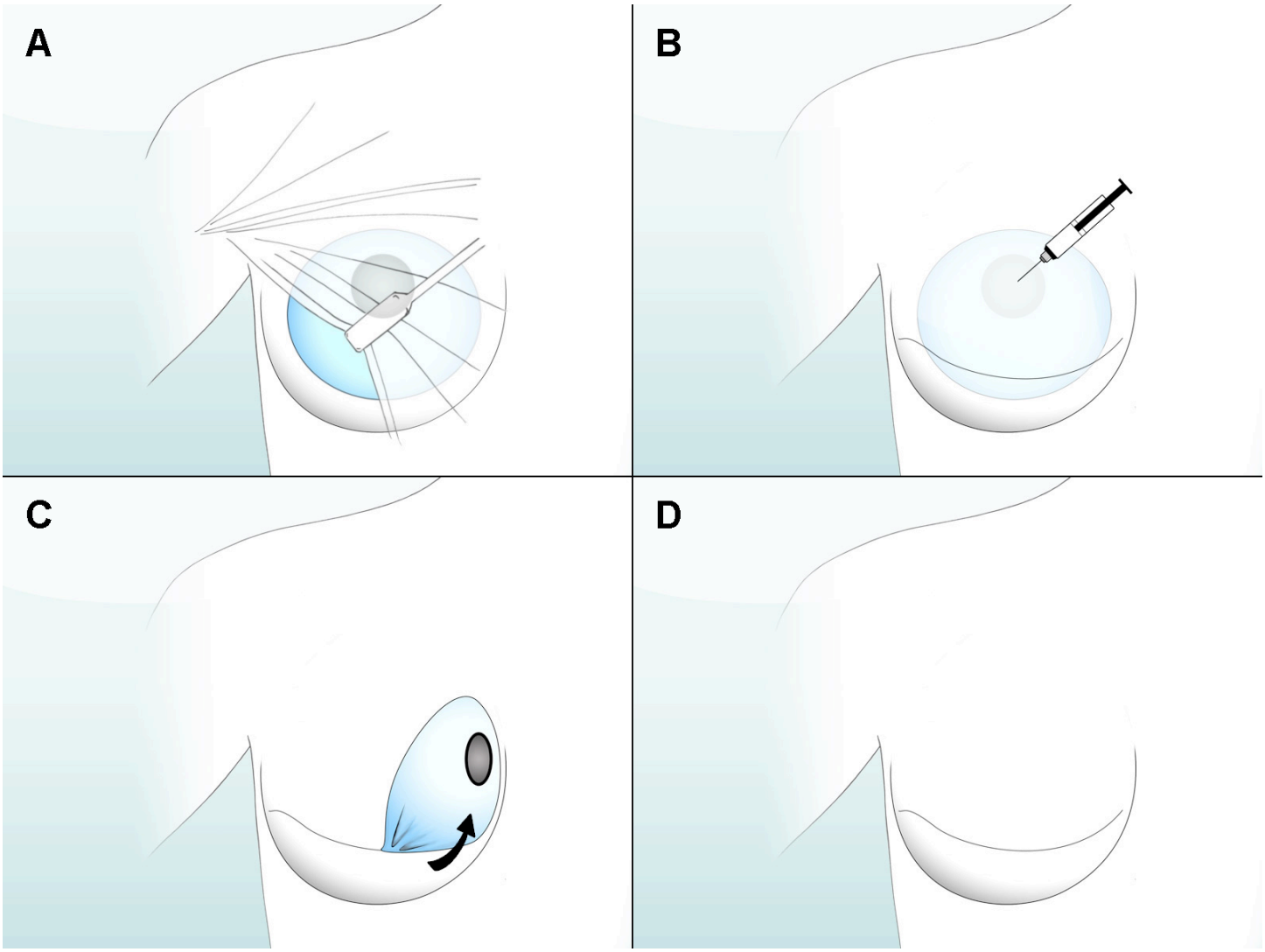
When the skin is soft and the pocket has stretched enough, a new implant is chosen to match the ideal size. In the second surgery, the “expander” is taken out through the original breast scar. The new implant is placed in the pocket. This will be the permanent implant.

Pros:
- More size, shape, and texture options
- Second operation can be used to balance the look of both sides

Cons:
- Clinic visits every week for a few months
- Need two surgeries under a general anesthetic
- Final implant size is not adjustable

Figure 2. The "integrated port" two-staged tissue expander/implant reconstruction.

(A) The saline implant with a built in port (expander) is placed in a pocket. The pocket is in between the chest muscle (pectoralis major) and the rib. The tissue expander is placed under the chest wall muscle
(B) The port is used to fill the implant with saline so that it can expand. Expansion occurs through injection of saline through the tissue into the port
(C) Once the "expander" has reached the right size, it is removed through part of the original scar. The final breast implant is then put in the pocket
(D) The final shape of the breast is done



Potential Complications

Complication	Treatment
Infection	You will need antibiotics and surgery. Doctors will likely take out the implant.
Bleeding or Hematoma	Iron supplements are needed in most patients. Blood transfusions will be needed if a lot of blood is lost. Surgery is needed to drain a hematoma.
Pulmonary embolus (PE), deep vein thrombosis (DVT)	Blood clots may form in the legs and lung. For long surgeries, anti-clotting medication is given after surgery to protect against this. Long-term anti-clotting medication is needed if this occurs.
Scarring around the implant in the pocket (Capsular contracture)	Surgery to deal with the scar. Implant may need to be changed.
Implant moves (Implant malposition)	Surgery to reposition the implant.
Implant leaks or breaks (Implant rupture)	Surgery to remove and change the implant.
Implant breaks through the skin (Implant exposure)	Surgery to remove the implant.
Fluid that collects in a space (Seroma)	Fluid may need to be drained.
Effect of radiation	A “delayed reconstruction” may not be possible. Radiation after an “immediate reconstruction” can harm the site of the surgery. Over time, this may put you at higher risk for problems to that area. In order to fix them, another surgery would be needed.
Both sides do not look the same (Asymmetry)	There will be a difference in size and shape between the two breasts. It is nearly impossible to match the other breast in shape and position. A second surgery (balancing surgery) to fix this may be needed.
Scars	Scars are present. Scars may be raised, red and very itchy. Surgery to fix the scar may be needed.

Surgery that is done to correct a problem with an implant is done under a general anesthetic. The original scar is used to take out the implant. Repairs to the pocket are made and a new implant is put in. The muscle and skin are closed.

- **Surgery time:** About 1 hour to place the implant
- **Hospital stay:** Day surgery - occasionally one night stay
- **Home care:** Dressing changes
- **Recovery time:** 2-3 weeks to fully heal the incision

If applicable:
- **To expand the pocket:** 2-3 months, weekly or bi-weekly visits (Please read Section 2. a. II)

FAQs

1) How long will the implant last?
In majority, your implant will not last forever. Some implants will need to be changed at 5 years and some at 25 years, but most of them will last 10-15 years.

2) What happens if I need the implant changed?
You do not have to go through the entire process again. The scar around the implant and the implant is removed and exchanged for a new implant during a short surgery under general anesthesia.

3) If I had radiation before the implant, will it cause more problems?
Most likely. Short term, your implant is at more risk of infection. Your skin may be more sensitive to the stretching. You will develop more scar around your implant. This can change the shape of your breast or cause pain.

b. Implant with your own skin, fat and muscle (Autologous Tissue) Reconstruction

The Back Flap (Latissimus Dorsi Flap) (See Figure 3 & 4)

If you have had radiotherapy to your chest, your skin may not be able to heal or stretch as well as it used to. Putting a cushion between the implant and the damaged skin can make the implant surgery safer. Healthy skin, fat and muscle can be taken from your back to make this cushion. (Figure 3) This may help reduce scar tissue from growing around the implant. An implant may not be needed if there is enough skin and fat to make the breast mound.

- **Surgery time:** 2-3 hours each breast
- **Hospital stay:** 1-3 nights
- **Home care:** Drains and dressing changes
- **Recovery time:**
  - Expander 3 – 4 weeks
  - Flap 4-8 weeks until back to regular activities

Tissue from the back may be used when:
- Women have had radiotherapy to the chest skin and muscle (chest wall tissue).
- Chest wall tissue that is not in good condition.
- No extra skin, fat and muscle on abdomen or buttocks can be found.

Tissue from the back may not be used when:
- Muscles in the armpit or back have been damaged from past surgery.
- Blood vessels in the armpit or back have been damaged from past surgery.

Pros:
- Healthy tissue to cover the implant
- Less chance of scarring around the implant in the pocket

Cons:
- Can have possible problems of implant surgery and own body (autologous) tissue reconstruction
- Both sides do not look the same (asymmetry)
- A scar is left on the back
- Shoulder may feel weak
- Mild weakness in rowing or climbing activities
- May have weakness using crutches

Figure 3.

(A) This is the muscle (latissimus dorsi) that is used and where it is located on your back
(B) The flap includes a skin island that will be part of the new breast [identify with labels]
(C) This is a view of the back after the surgery. There is a diagonal scar. This will be hidden by the skin wrinkles. The skin island will usually feel numb
Note: Surgeons may plan this surgery so the scar is along the bra-line. It can be hidden when a bra is worn

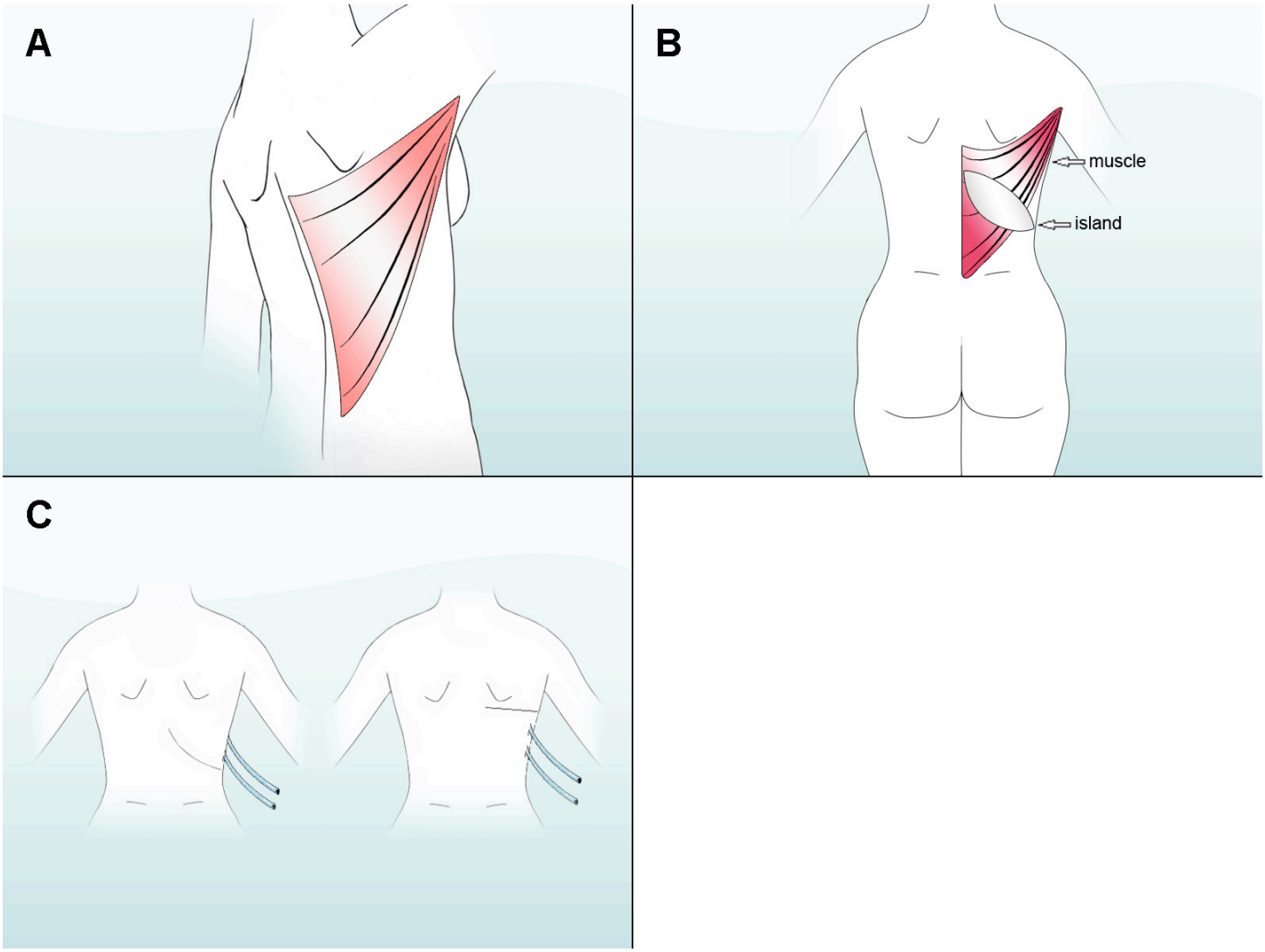
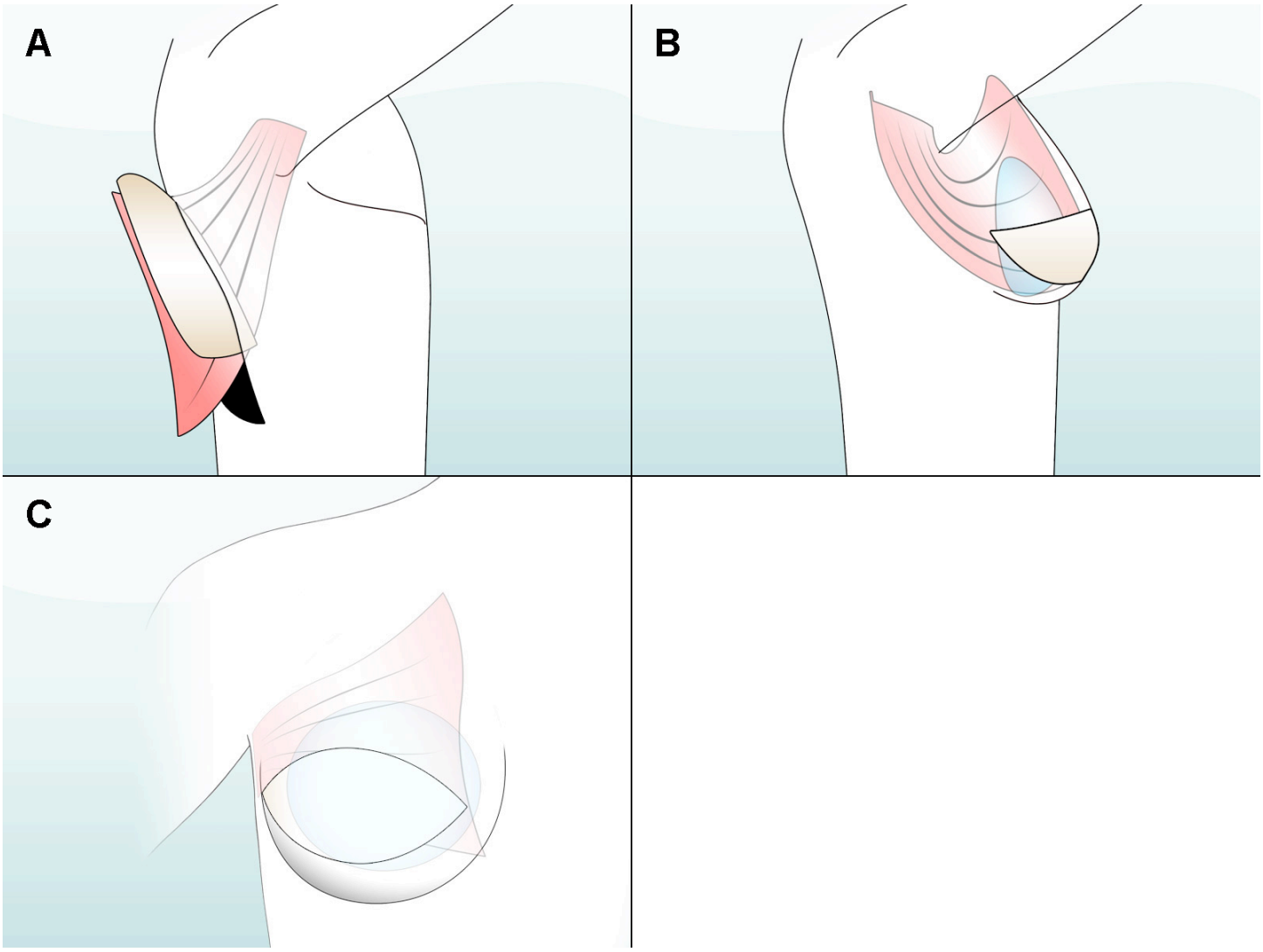


Figure 4.

(A) To make the flap: muscle, skin, and fat are taken from the back. The surgeon makes sure the blood vessels that keep the flap alive are working
(B) The flap is tunneled through the armpit and placed on the chest. The flap is placed over the implant or the expander. Muscle and skin are fixed into position to make the breast form
(C) The back is closed in a straight line. Drains are placed in the back and in the chest. They will drain the fluid that collects under the skin
Front view of the scars and the new position of the back muscle (latissimus dorsi). The implant is buried under the skin



Potential Complications

Complication	Treatment
Fluid that collects in a space (Seroma)	This often occurs in the back where the muscle was taken (donor site). The fluid collects in the space where the muscle used to be. A drain is put in place. It will need to stay in place for several days to weeks.
Flap does not survive (Flap necrosis)	Part, or, the entire skin and muscle may not survive. The dead tissue will need to be removed. This may be done in the clinic or the operating room. Open wounds may need wound care for a long period of time.
Infection	You will need antibiotics and surgery. Doctors will likely take out the implant.
Bleeding or Bruising (Hematoma)	Iron supplements are needed in most patients. Blood transfusions will be needed if a lot of blood is lost. Surgery is needed to drain a hematoma.
Pulmonary embolus (PE), deep vein thrombosis (DVT)	Blood clots may form in the legs and lung. Anti-clotting medication is given after surgery to protect against this. Long-term anti-clotting medication is needed if this occurs.
Problems with the pocket (Capsular contracture)	Surgery to deal with the scar. Implant may need to be changed.
Implant moves out of position (Implant malposition)	Surgery to reposition the implant.
Implant breaks or tears (Implant rupture)	Surgery to remove and change the implant.
Implant breaks through the skin (Implant exposure)	Surgery to remove the implant.
Movement of the muscle (latissimus dorsi)	Surgery to cut the nerve.
Both sides do not look the same (Asymmetry)	There may be a difference in size and shape between the two breasts. It is nearly impossible to match the other breast in shape and position. Another surgery (balancing surgery) with a local anesthetic may be needed to fix this.
Scars	Scars are present. Scars may be raised, red and very itchy.

FAQs

1) How long will my scar be?
10-20cm. A little bit lower than your shoulder blade.

2) Will the arm on the side of the surgery be weak?
Patients with an average level of activity do not complain of a weakness. During strenuous activities such as rowing, climbing, or swimming some patients may notice a difference.

c. Autologous Tissue Reconstruction

I) Pedicled TRAM Flap (transverse-rectus abdominis myocutaneous flap) (See Figure 5)

- **Surgical time:** 4 – 6 hours
- **Hospital stay:** 3-4 days
- **Home care:** Dressing changes and drains
- **Recovery time:** 6-8 weeks

Skin and fat from the lower abdomen, with entire part of the "six-pack" muscle in the stomach area (rectus abdominis muscle) are used to make the flap. This flap stays attached to the muscles in the stomach area. (abdomen) The flap is passed through a tunnel under the skin until it reaches the breast area. Blood vessels from the abdomen supply the blood flow to the flap.

Pedicled TRAM flaps may be used:
- When there is extra fat in the lower abdomen
- In non-smokers
- In women who have not had radiotherapy
- In women who are not very active
- In women who do not have enough skin & fat on their back
- When women do not want to use implants
- In health problems where shorter surgery times are safer

Pedicled TRAM flaps may NOT be used:

- If certain abdominal surgeries have been done in the past. You will need to discuss this with your surgeon. Some examples include:
  - Liposuction
  - Abdominal surgeries
  - Gall bladder removal
- There may have been damage to the blood vessels. This may increase the risk that the flap may not survive. (flap necrosis) You may need some extra tests (CT scan) to make sure the surgery will be safe to perform.
- In smokers
- In diabetics
- In patients who are too thin or too overweight

Pros:

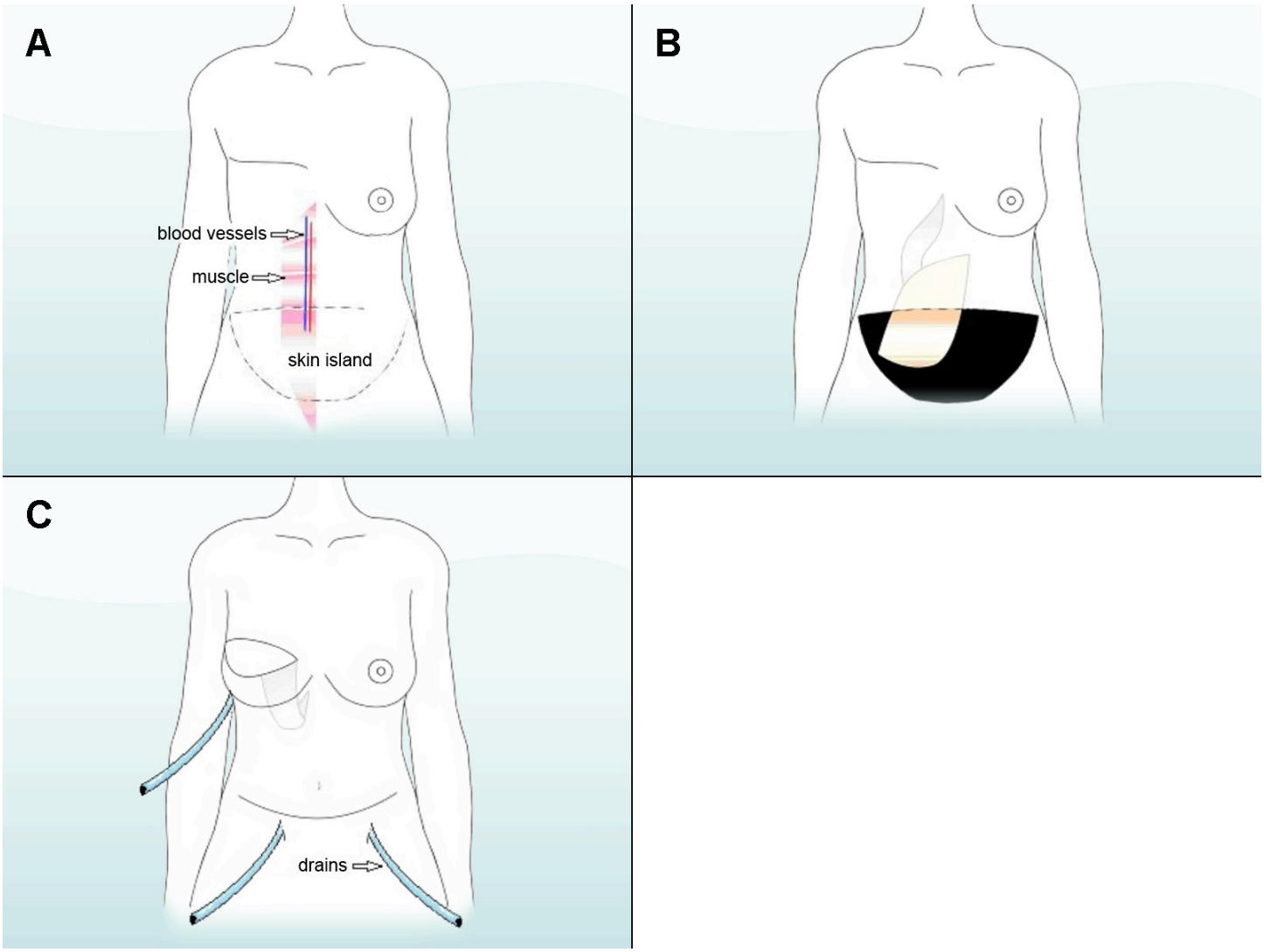
- Breast is rebuilt with your own body tissue
- Clear blood supply
- Creates a more natural "droop" to the breast compared with implants
- "tummy-tuck"-type procedure done at the same time. Scar is low and can often be hidden at the waistline
  - **Note:** This is not a cosmetic "tummy-tuck". Attention to the shape and look of the abdomen is important but is not the main focus
- Breast size will change with weight gain and loss

Cons:

- May develop fat necrosis. This feels like a hard lump under the skin. Fat necrosis may complicate follow-up and cause anxiety because it may feel like cancer. More tests will be needed to make sure it is not cancer. You may need a biopsy
- Using an entire "six-pack" muscle (rectus muscle) may cause your stomach muscles to be weak

Figure 5.

(A) An area of skin on the abdomen is marked off. The flap is made with the skin, fat and muscle from this area. Blood vessels from the abdomen supply the blood flow to the flap
(B) The flap is passed through a tunnel under the skin until it reaches the breast area
(C) The flap is put in place to make the breast mound. Drains are placed and the skin is closed. The final breast shows the skin island as a "leaf shape". Scar on the abdomen is also shown



Complications and Treatment:

Complication	Treatment
Fat necrosis	You may need surgery to remove. The treatment may be done in clinic or in the operating room.
Partial or total flap loss	You will need surgery to remove the dead tissue. This will be done in the operating room.
Abdominal hernia or bulge	You will need surgery in the operating room.
Bulge under the breast	You will need surgery in the operating room.
Infection	You will need antibiotics. If severe, you will need surgery to drain the infection.
Bleeding or Bruising (Hematoma)	Iron supplements are needed in most patients. Blood transfusions will be needed if a lot of blood is lost. Surgery is needed to drain a hematoma.
Pulmonary embolus (PE), deep vein thrombosis (DVT)	Blood clots may form in the legs and lung. Anti-clotting medication is given after surgery to protect against this. Long-term anti-clotting medication is needed if this occurs.
Fluid that collects in a space (Seroma)	You may need surgery to drain the fluid.
Both sides do not look the same (Asymmetry)	There may be a difference in size and shape between the two breasts. It is nearly impossible to match the other breast in shape and position, but easier compared to implant reconstruction. Surgery in the operating room or in the clinic may be needed.
Scars	Scars are present. Scars may be raised, red and very itchy.

FAQs

1) Will it look like a tummy tuck?

Yes, it can look like an cosmetic tummy tuck. Your surgeon may have to make the scar a little bit higher or a little wider than an esthetic tummy tuck.

2) Will the tissue from my abdomen feel like my breasts?

It's almost the same. The tissue in the lower abdomen is very close to the tissue in your breasts.

II) Free Abdominal flaps (See Figure 6 & 7)

- **Surgical time:** Up to 8 hours for one breast, 10-12 hours for two breasts
- **Hospital stay:** 3-5 days
- **Home care:** Dressing changes, drains, restricted activity for 4-8 weeks
- **Recovery time:** Cannot do lifting for 4-8 weeks. Need 2-3 months to feel well enough for normal activities

There are 3 types of free abdominal flaps:
1. TRAM 2. DIEP 3. SIEA

It is called a "free" flap because the entire flap is lifted off the body and moved to the breast area. No part of the flap stays attached to the stomach area (abdomen).

All the flaps are made from skin and fat taken from the lower stomach area (abdomen). Blood vessels are also taken from here. They are used to supply blood to the flap. The TRAM flap also needs a small piece of muscle taken from the "six-pack" muscle. The DIEP & SIEA flaps do not need a piece of muscle. The type of flap that is used depends on the state of the blood vessels seen in surgery. The flaps are connected to blood vessels under the arm or in the chest.

After the surgery, doctors and nurses will check your connected flap on a regular basis (color, Doppler etc.). This is very important. The flap needs to have blood supply for it to live

Free abdominal flaps may be used:
- For different breast sizes.
- For women who are active.
- With women who have extra skin and fat on there stomach (abdomen).
- For women who have had radiotherapy to the chest.

Free abdominal flaps may NOT be used:
- With some types of abdominal surgery or liposuction done in the past. You may need some extra tests (CT scan) to make sure the surgery will be safe to do.
- If blood vessels in the abdomen, chest, and underarm are damaged.
- In women who are not healthy enough to have long surgery. In medically unstable patients unable to tolerate long surgeries.
- In smokers, diabetics that are not well controlled, and obese women.

Pros:
- Breast is rebuilt with your own body tissue
- The flap can be moved into many positions, which gives more options to shape the new breast
- Breast size will change with weight gain and loss
- Less chance of needing more surgery in the future than in implant reconstruction

Cons:

- Not all breast centers have the experts to do this type of surgery and follow-up after surgery
- After surgery, if the blood vessels get blocked, you will need many surgeries. Free flap surgery has the highest risk of having to return for emergency surgery
- Long surgery8 hours
- Long stay in hospital - 4-5 days
- Damage to the nerves may cause your stomach muscles to be weak

The Free Abdominal Flap

Figure 6. Free abdominal flap that is connected to the blood vessels under the arm (thoracodorsal vessels).

(A) Blood vessels that supply blood to the flap comes from the abdomen
(B) An area of skin and fat is marked and taken from the abdomen
(C) The entire flap is lifted from the body. If it is a TRAM flap, it is made with skin, fat and muscle. If it is a DIEP or SIEA flap, there is no muscle
(D) The flap is moved to the breast area to form the shape of the breast. The blood vessels under the arm are connected to the blood vessels in the flap. Special surgery called “microsurgery” is needed to connect the blood vessels
(E) This is what the breast will look like after the surgery. There will be a scar on the abdomen

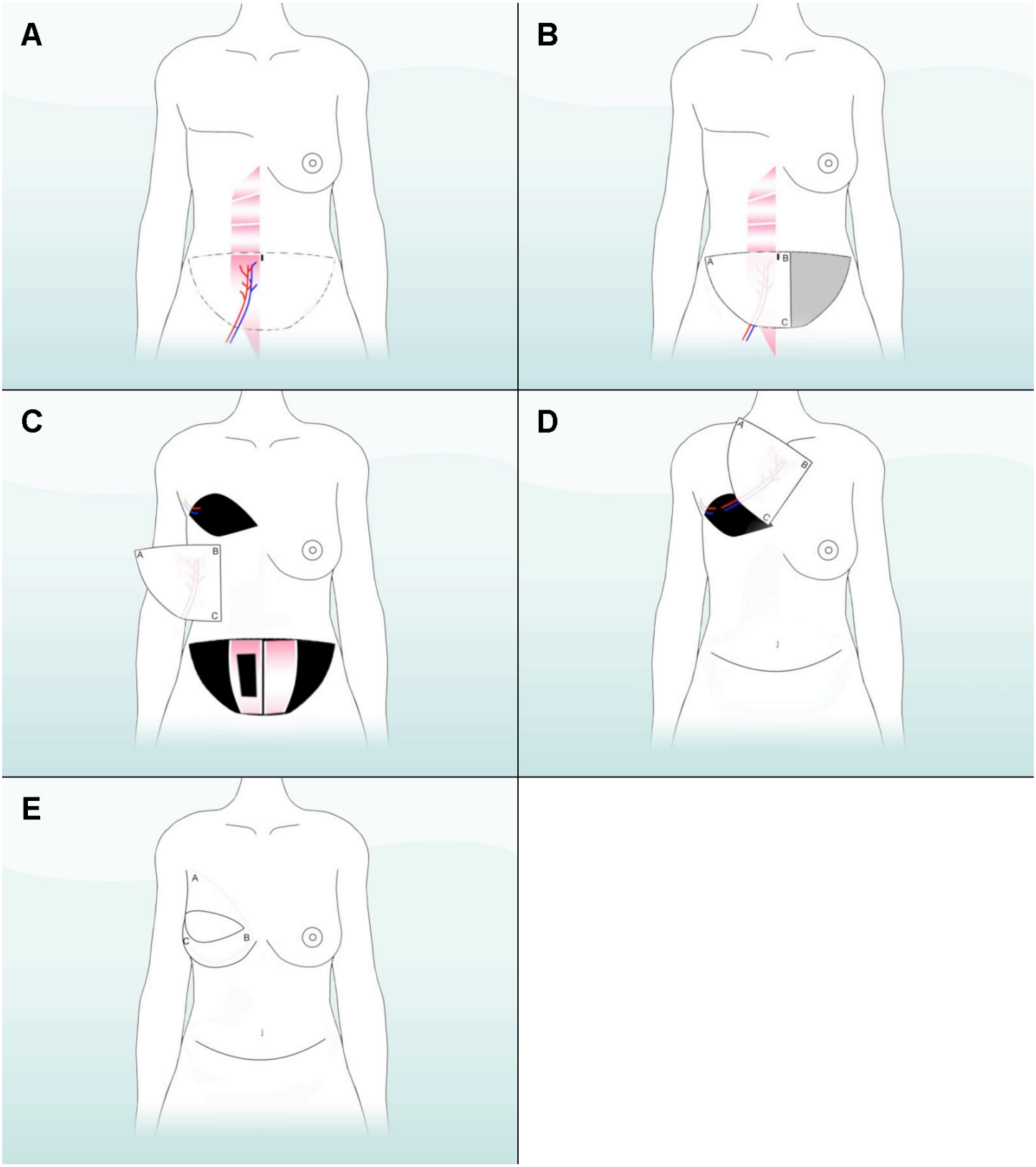
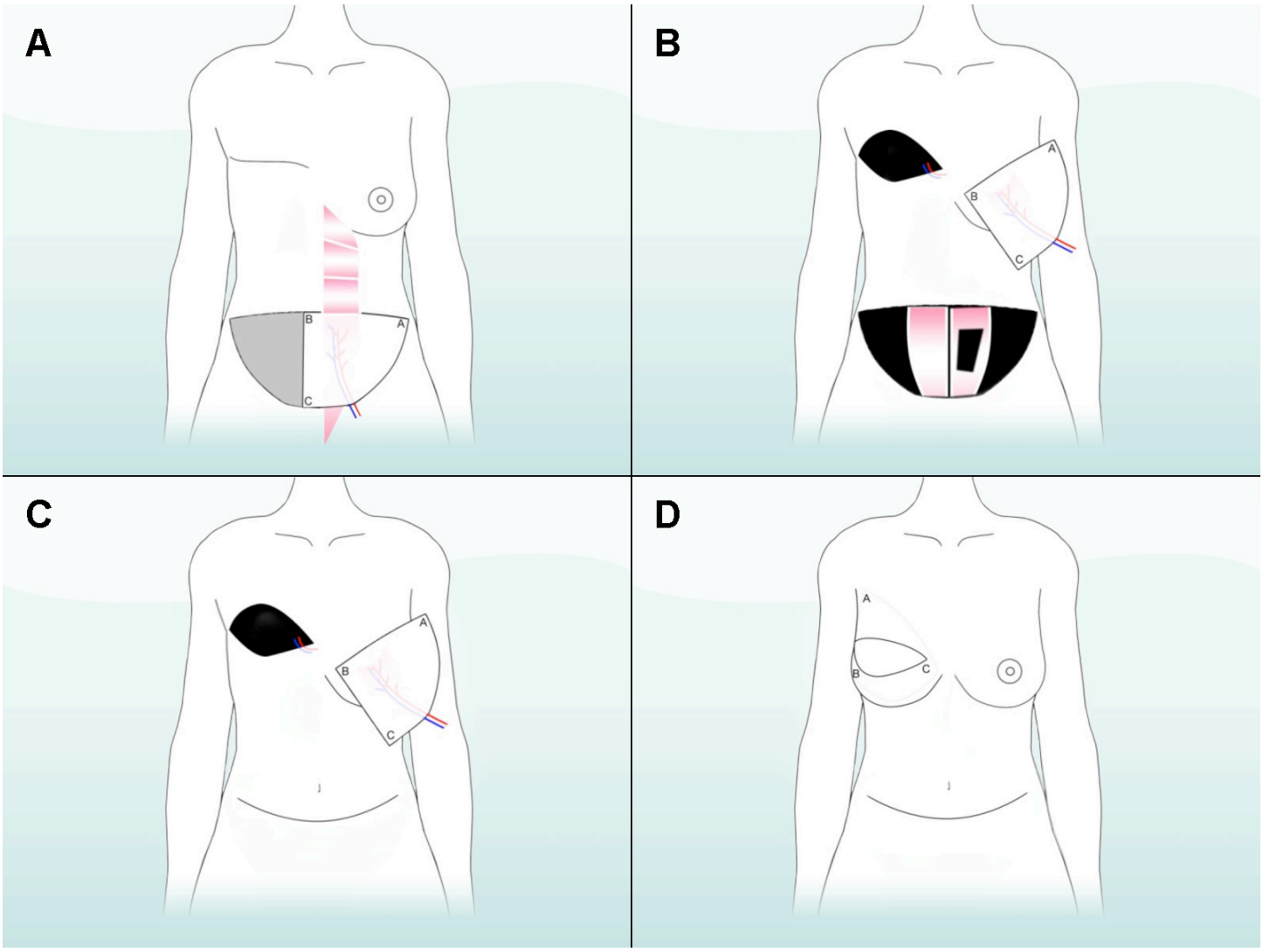

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Figure 7. Free abdominal flap that is connected to blood vessels in the chest (internal mammary vessels)

(A) Blood vessels that supply blood to the flap comes from the abdomen. An area of skin and fat are marked and taken from abdomen
(B) The entire flap is lifted from the body. If it is a TRAM flap, it is made with skin, fat and muscle. If it is a DIEP or SIEA flap, there is no muscle
(C) The flap is moved to the breast area to form the shape of the breast. The blood vessels in the chest are connected to the blood vessels in the flap. Special surgery called "microsurgery" is needed to connect the blood vessels
(D) This is what the breast will look like after the surgery. There will be a scar on the abdomen



Potential complications

Complication	Treatment
Blood clots in the blood vessels connected to the flap	Emergency surgery in the operating room is needed to remove the clots. You will need blood transfusions and blood thinners to save the flap. Even with surgery, some or the entire flap may be lost.
Blood flow blockage	Bending, "kinks" or pressure on blood vessels may block blood flow to the flaps. This will need emergency surgery in the operating room.
Bleeding or Bruising (Hematoma)	If blood loss is mild, may need iron supplements. You will need blood transfusions if a lot of blood is lost. Urgent surgery to drain the hematoma will be needed.
Partial or total flap loss	You will need surgery in the operating room to remove the dead tissue. This is done in the operating room.
Blood clot in your lung (Pulmonary embolus -PE) Blood clot in a vein (deep vein thrombosis - DVT)	Blood clots may form in the legs and lung. Anti-clotting medication is given after surgery to protect against this. Long-term anti-clotting medication is needed if this occurs.
Infection	You will need antibiotics. If severe, you will need to have surgery to drain the infection.
Dead fat cells in the flap (Fat necrosis)	You may need surgery to remove the dead cells. The surgery may be done in clinic or in the operating room.
Collection of fluid in a space (Seroma)	Fluid may need to be drained.
Abdominal hernia or bulge	If it bothers you, will need surgery in the operating room.
Both sides do not look the same (Asymmetry)	There may be a difference in size and shape between the two breasts at first, or due to weight changes. It is nearly impossible to match the other breast in shape and position. Revision surgery in the operating room or in the clinic may be needed.
Scars	Scars are present in all surgery. Scars may be raised, red and very itchy.

FAQs

1) Will I have any feeling in my new breast?

It varies. Most patients will feel the pressure of a bra or a touch but it will never be the same as it was before. Some surgeons have tried to attach a nerve from your chest to the free flap but it did not improve the result.

2) Should I still get a mammogram of my new breast tissue?

Yes. For all types of breast reconstruction you should still get a mammogram over the new breast.

III) Alternative Autologous Tissue Reconstruction

Sometimes, free abdominal flap surgery cannot be done. The gluteal free flap or the upper thigh free flap can be considered. This surgery takes longer and has a higher complication rate than a free abdominal flap. They are not commonly used.

1. Gluteal free flap – SGAP & IGAP (See Figure 8 & 9)

- **Surgical time:** Up to 8 hours for each breast
- **Hospital stay:** 4-5 days. Need to keep pressure off the buttock
- **Home care:** Dressings, drains, restricted activity (sitting) for 4-6 weeks
- **Recovery time:** Need 2-3 months until you feel well enough to do normal activities.

It is called a "free" flap because the entire flap is lifted off the body and moved to the breast area. No part of the flap stays attached to the bum (buttock).

The SGAP flap is made from skin & fat taken from the upper buttock. The IGAP flap is made from skin and fat from the lower buttock. Blood vessels are also taken from here. They are used to supply blood to the flap.

After the surgery, doctors and nurses will check your connected flap on a regular basis (color, Doppler etc.). This is very important. The flap needs to have blood supply for it to live.

Free gluteal flaps may be used:
- For smaller breast sizes.
- For women who are active.
- In women with extra skin & fat on the buttock.
- For women who have had radiotherapy to their chest.

Free gluteal flaps may NOTbe used:
- If blood vessels in the abdomen, chest, and underarm are damaged.
- In women with large breasts.
- In women who are not healthy enough to have long surgery.
- In smokers and diabetics that are not well controlled.

Pros:
- Uses extra skin and fat from the upper or lower buttock
- No muscle is taken

Cons:
- Left and right buttock do not look the same (buttock asymmetry)
- Doctor cannot take as much skin and fat from the buttock compared to the abdomen.
- Not easy to shape a natural looking breast
- Scar on the upper or lower buttock
- Higher chance of flap failure compared to abdominal flaps

Figure 8. SGAP Flap

(A) Blood vessels that supply blood to the flap come from the upper buttock. An area of skin and fat is marked and taken from this area. Drains are put in place and skin is closed
(B) A scar can be seen on buttock
(C) The flap is transferred to the breast and connected to the blood vessels in the chest
(D) Final appearance of the breast

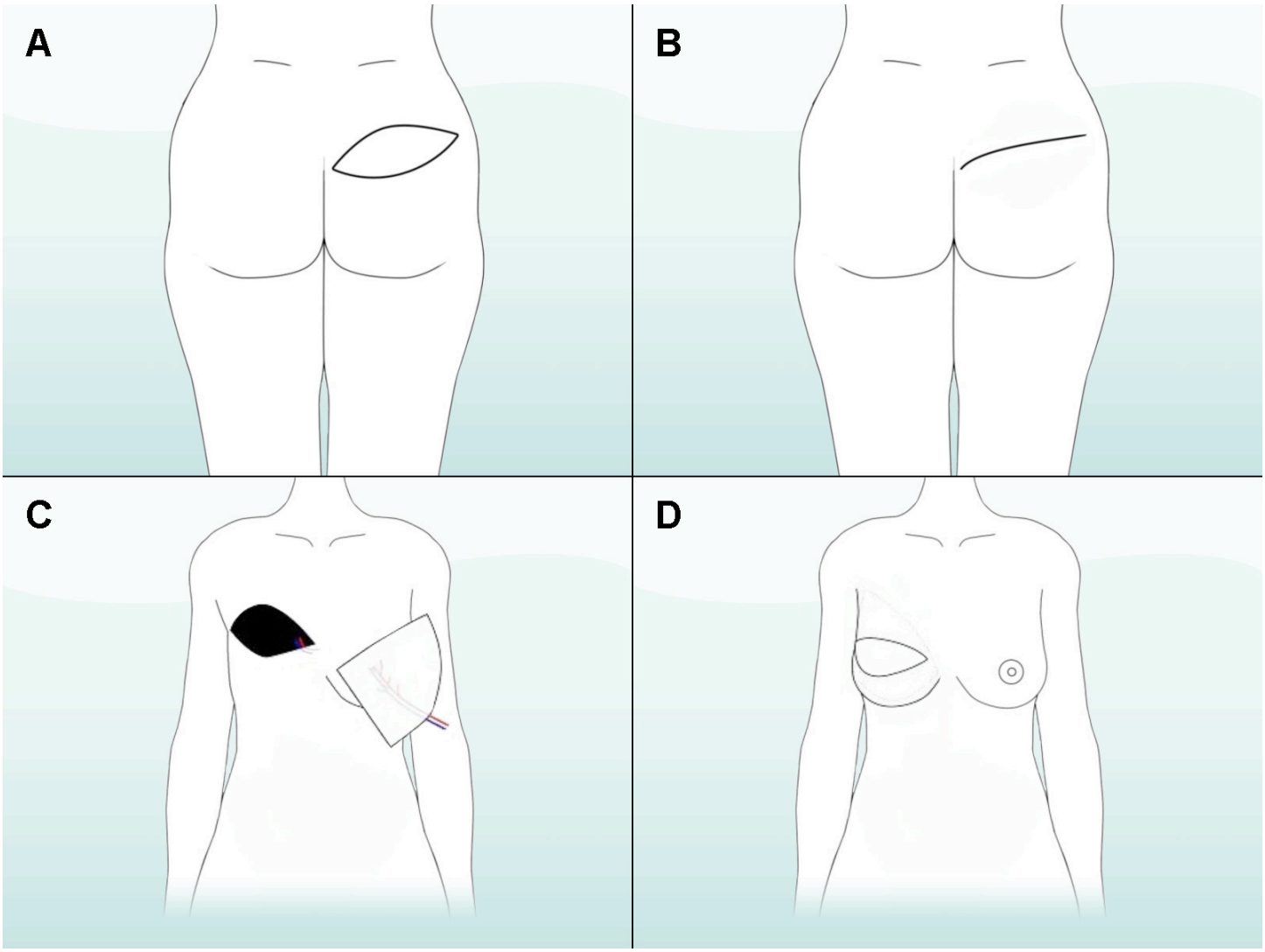
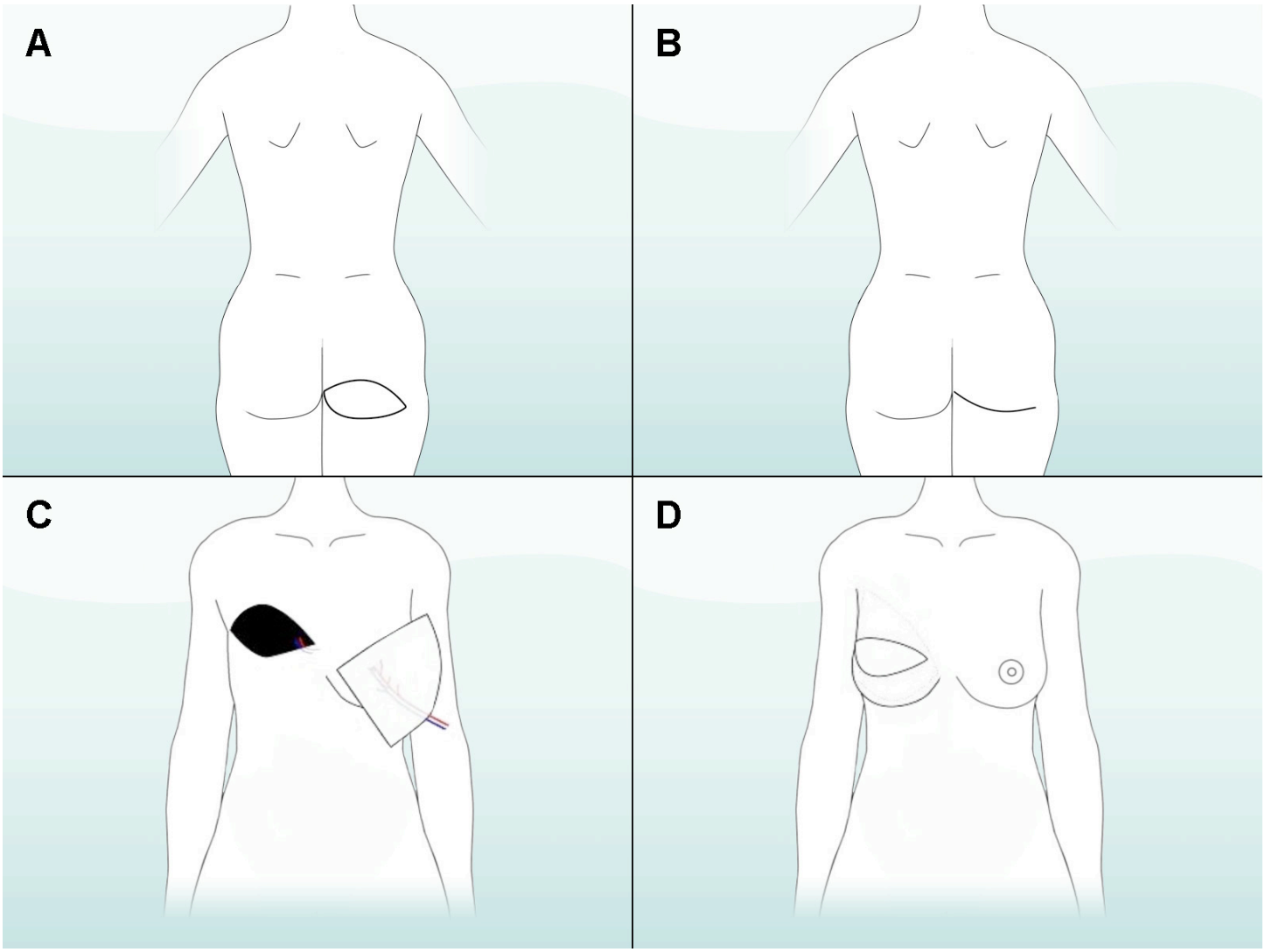


Figure 9. **IGAP Flap**

(A) Blood vessels that supply blood to the flap come from the lower buttock. An area of skin and fat is marked and taken from this area. Drains are put in place and skin is closed
(B) A scar on the buttock is seen
(C) The flap is transferred to the breast and connected to the blood vessels in the chest
(D) Final appearance of the breast



2. Upper thigh free flap –TUG flap (transverse upper gracilis) (See figure 10)

- **Surgery:** Up to 8 hours for one breast
- **Hospital stay:** 4-5 days
- **Home care:** Dressings, drains, restricted activity for 4-6 weeks
- **Recovery time:** You will need 2-3 months until you eel well enough to do normal activities

It is called a “free” flap because the entire flap is lifted off the body and moved to the breast area. No part of the flap stays attached to the inner thigh.

The TUG flap is made from skin, fat and muscle taken from the inner thigh. Blood vessels are also taken from here. They are used to supply blood to the flap.

After the surgery, doctors and nurses will check your connected flap on a regular basis (color, Doppler etc.). This is very important. The flap needs to have blood supply for it to live.

Free thigh flaps may be used:
- For smaller breast sizes.
- In women with extra skin & fat on the inner thigh.
- For women who have had radiotherapy to their chest.

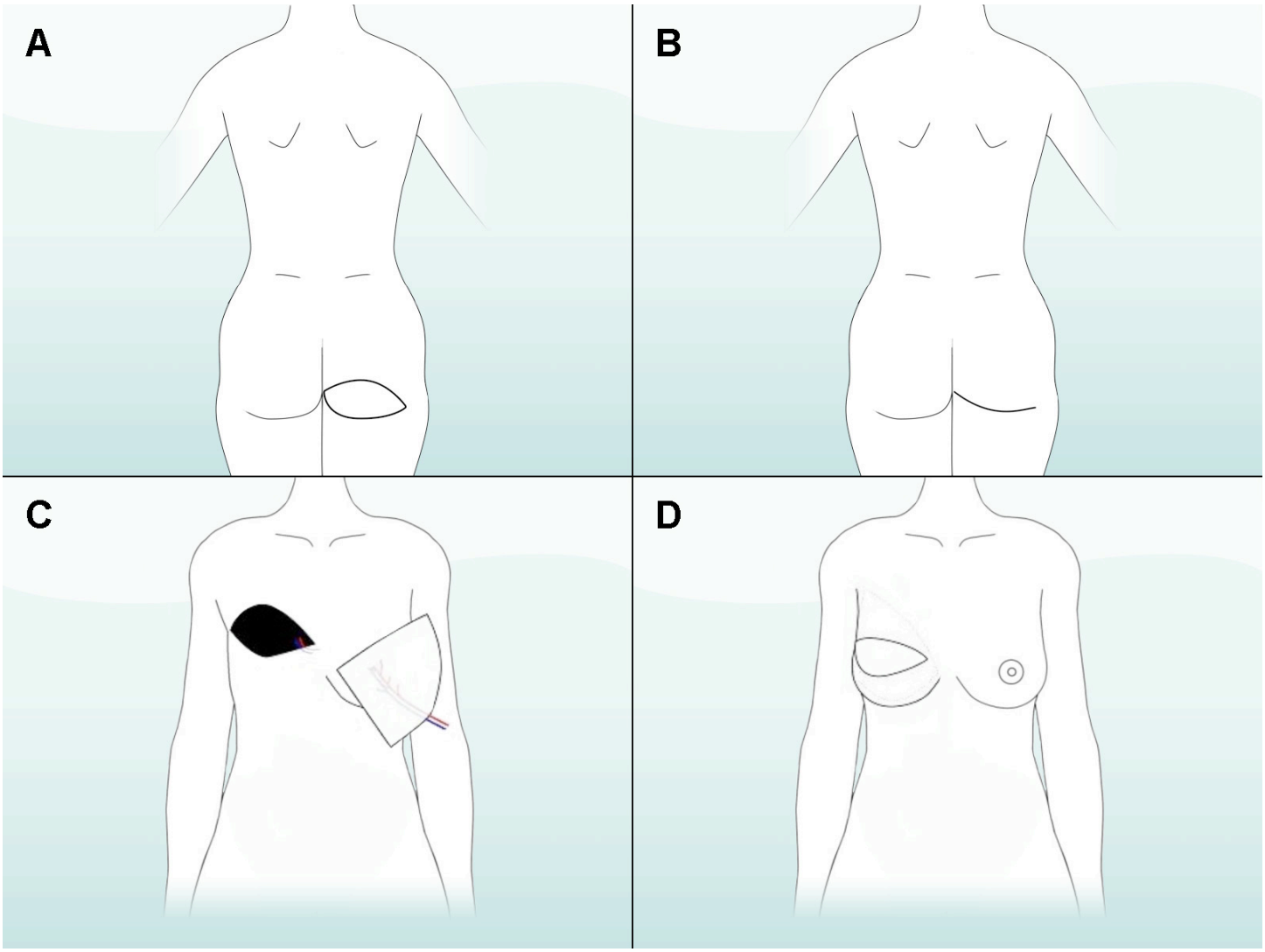
Free thigh flaps may NOT be used:
- If blood vessels in the abdomen, chest, and underarm are damaged.
- In women with large breasts.
- In women who are not healthy enough to have long surgery.
- In smokers and diabetics that are not well controlled.

Pros:
- Uses extra skin and fat from the inner thigh
- Scars are well hidden along the crease of the inner thigh
- Lower chances of nerve injury compared to the buttock flap

Cons:
- Cannot take as much skin and fat from the inner thigh compared to the abdomen.
- Chance of permanent swelling in the foot/ankle
- Sensitivity/pain in scar could be awkward in intimate relations
- Often get a spread scar
- Not easy to shape a natural looking breast

Figure 10. Upper thigh free flap (Transverse Upper Gracilis or "TUG" Flap).

(A) Blood vessels that supply blood to the flap come from the inner thigh. An area of skin, fat and muscle is marked and taken from this area
(B) Scar is on the inner crease of the thigh
(C) The flap is transferred to the breast and connected to the blood vessels in the chest
(D) Final appearance of the breast



FAQs

Are these free flaps a better option than a free abdonminal flap?
Most of the time, these options are reserved for when you've had a problem with an abdominal flap. Even though it may look like a good option for you, these surgeries are more difficult to perform and there are fewer surgeons available to perform them.

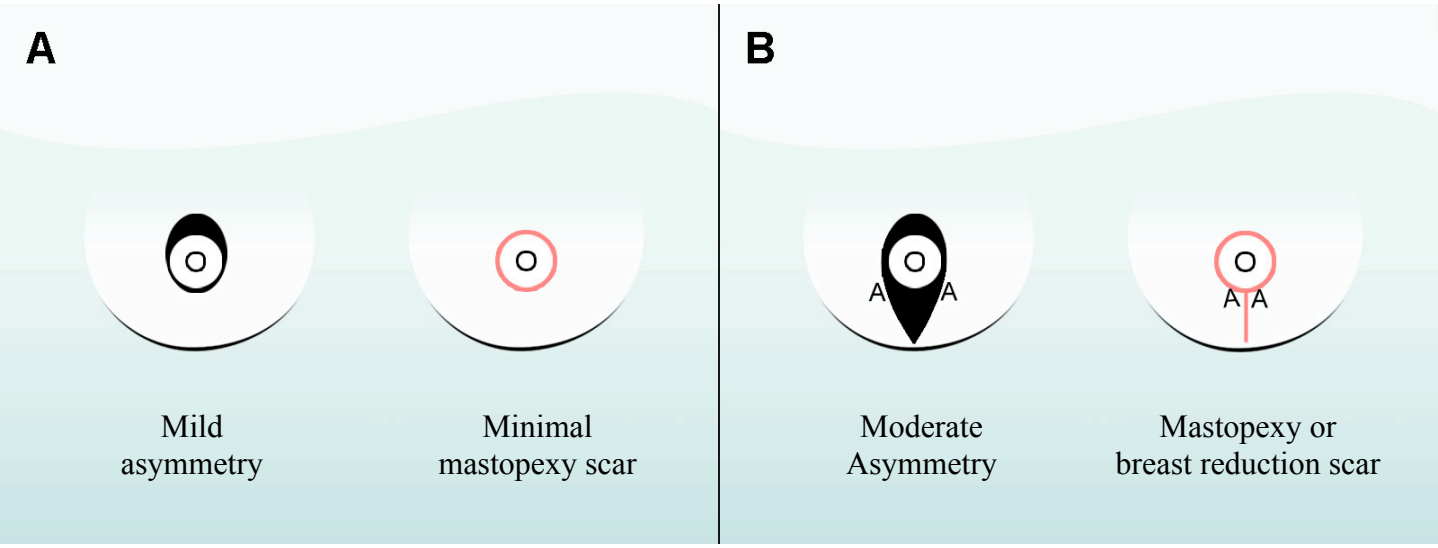
SURGERY TO BALANCE THE OTHER BREAST

The main goal of breast reconstruction is to create a breast that looks nice and matches the other one. It is hard to make them match perfectly. Every effort is made to make them match as closely as possible. Surgery to correct the shape and size of the other breast is often done to help match the new breast. This type of surgery can also be used in women who had only a part of their breast removed (lumpectomy, partial mastectomy) to improve the shape of the partial breast defect.

a. Breast Lift (Balancing mastopexy)

The nipple and breast tissue are placed in a higher position with some skin removal to match the reconstructed breast. The overall effect is a higher and firmer breast mound. Fat and breast tissue are not removed; therefore there is very little change in size. (See Figure 11 A, B).

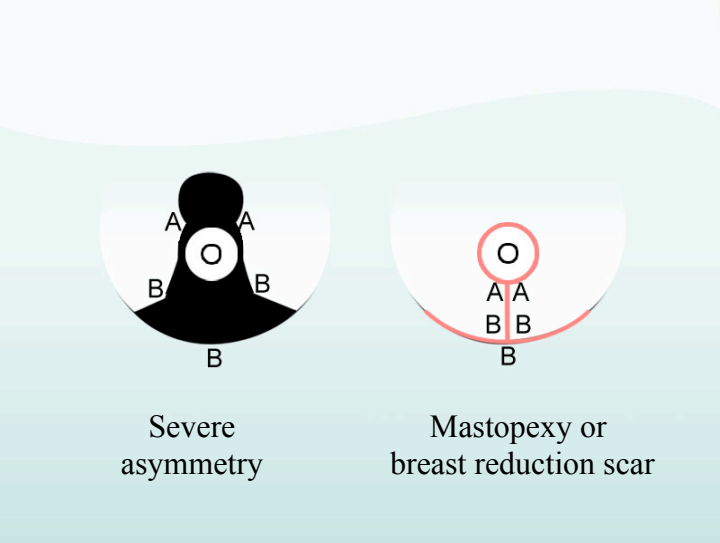
Figure 11. Breast balancing surgery scars (outlined in pink).



b. Breast Reduction (Balancing reduction mammoplasty)

Through the same incisions as a mastopexy, skin, fat, and breast tissue are removed in order to match the size of the other breast or the size desired by the patient (See Figure 12).

Figure 12



c. Balancing augment mammoplasty "Breast Implants"

In women with small breasts, putting an implant in the other breast can help to create balance. This can be done at the same time as the reconstruction or at a later date. This should not interfere with cancer treatment or follow-up.

4. NIPPLE AND AREOLA RECONSTRUCTION

Nipple and areola reconstruction are the last steps of breast reconstruction. This is done after the breast mound reconstruction is finished and the woman is happy with the way it looks. This is usually done six months to one year after the breast mound reconstruction.

There are generally two parts:
1. Making the nipple mound
2. Adding colour

For women who do not want any more surgery, tattooing alone is an option to add color and shading.

In certain cases, at the time of the mastectomy, the nipple and areola can be saved. This should be discussed with the breast cancer surgeon.

a. Nipple Mound Reconstruction

There are many techniques that can be used. Most commonly, the tissue in the breast mound is raised and folded to create the nipple. This is a small surgery. It can be done in an operating room but is often done in the clinic using local freezing. Some examples are shown below.

I) Local Flaps

The nipple is created using only the skin and fat over the breast mound. Examples of flaps may include the "C-V" flap, and the "Double Opposing Tab" flap.

Pros:
- Easy to do. Done under local anesthetic
- No skin grafts are needed

Cons:
- Smaller nipple mound long-term, may flatten over time
- Coloring needed to match the natural areola

II) Local Flaps with Skin Grafting

Skin and fat are taken from the breast mound to make the nipple. A skin graft is needed to cover the area taken. This is usually taken from an area where a scar already exists such as the abdomen or other breast. It is also used to reconstruct the areola. An example is the "Skate" flap.

Pros:
- Nipple is more visible and lasts longer over time

Cons:
- Skin graft needed, possibly creating a new scar
- Often needs to be done in the operating room under a general anesthetic
- Risk of graft loss
- Bulky dressings that cover the area
- Coloring often needed to match the natural areola

III) Free nipple graft

In certain cases, a part of the nipple on the other breast may be taken to create a new nipple on the reconstructed breast.

Pros:
- Better match to the natural areola

Cons:

- Small scar on the nipple donor site
- Risk of graft loss
- Donor nipple may lose some sensation

b. Areola Reconstruction

I) Grafts

The areola may be reconstructed using the skin from the other nipple. The goal is to get both areolas to match as closely as possible. A skin graft from the abdomen may also be used to create the new areola. Tattooing may be needed to match the color.

II) Tattooing (Need an Image)

The nipple/areola color is added as a tattoo on the flap skin to match the natural color. Tattooing can be done with or without a nipple mound creation. Usually a local anesthetic is used before the tattooing starts. Touch-up tattooing may be needed to reach or maintain the desired color.

- **Tattoo time:** 20-30 minutes each nipple
- **Recovery time:** 1-2 days, Moisturizing ointment and dressings are applied for several days