

WOUND CLOSURE



WOUNDS

----- Are breaks in tissue continuity.

-caused by trauma(physical, chemical, and biological).

-They are of different

***types, acute and chronic**

***different shapes and sizes, and**

***vary in their ways of healing.**

Rapid closure and rapid repair of wound is mandatory to

***assist and enhance wound healing process,**

***reduced morbidity and complications, and**

***even reduce mortality especially in extensive wounds and multiply injured patients.**

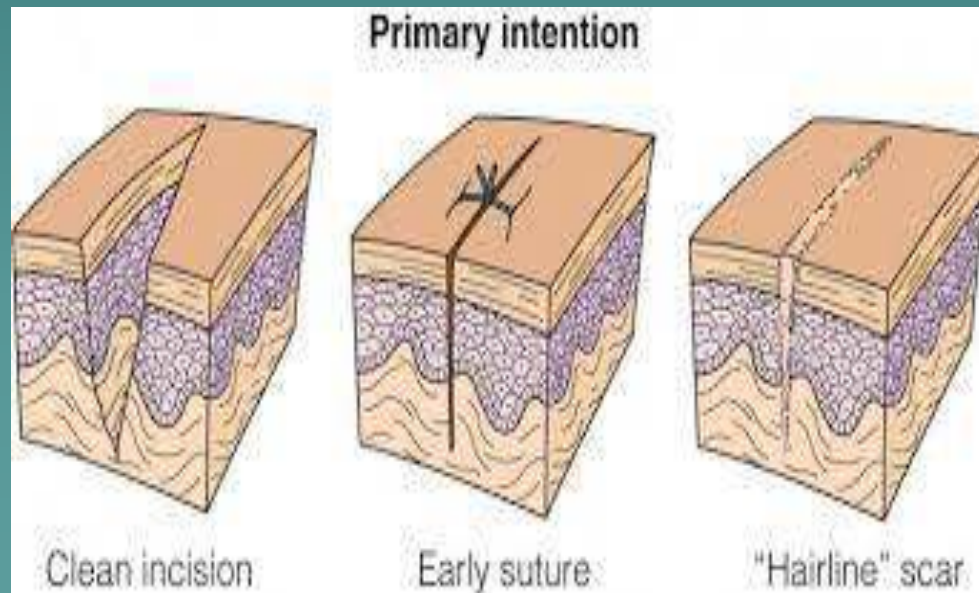
There are five methods for wound closure:

- 1. Direct closure (Primary and delayed)**
- 2. Direct closure assisted by undermining of margins.**
- 3. Leaving the wound to heal by secondary intention.**
- 4. Skin grafts.**
- 5. Skin flaps.**

DIRECT CLOSURE

----- means approximation of wound edges close together by stitches, staples, clips, or adhesive tapes etc---.

The wound heals by primary intention method with linear scar. When the wound closed immediately, as in clean traumatic wound or surgical wound, it is called primary closure, while delayed primary closure means direct closure of the wound after several days, when it becomes clean, as in contaminated traumatic wounds.



DIRECT CLOSURE ASSISTED BY UNDERMINING OF MARGINS

When the wound edges are so far that can not be approximated together without tension, we could make use of **skin elasticity and ability for stretching and relaxation.**

Undermining of the adjacent skin will help in direct closure of the wound. This undermining done at avascular plane of tissue as blunt dissection for **a distance equal to one half of the width of the wound.**

GRAFT

----- Is a piece of tissue transferred from one site (**donor site**) to another (**recipient site**), with complete separation from its circulation at donor site and it built new circulation at recipient site.

*Any tissue could be transferred as a graft, like skin, mucus membrane, bone, cartilage, tendon, nerve, fat. The aim of graft is to bypass a gap of tissue i.e. wound closure.

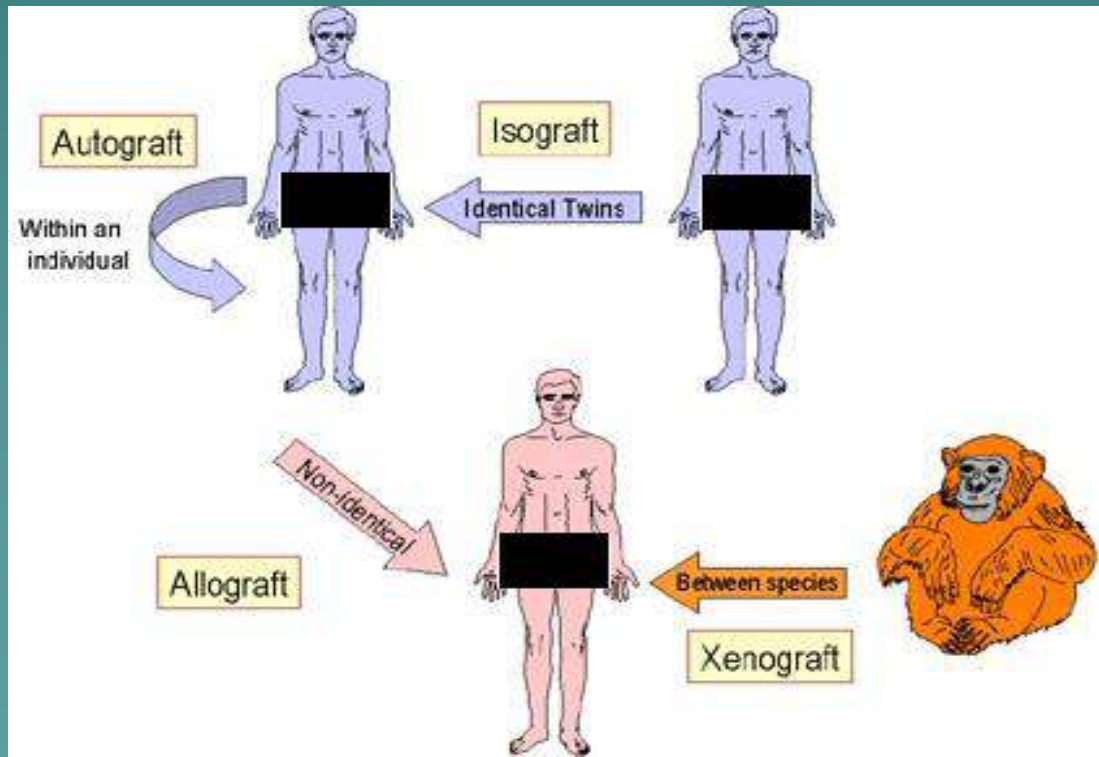
Classification: there are three types of graft according to the donor and recipient sites;

1. **Autograft** : is a graft that transplanted from one site to another in the same individual.

2. **Allograft**: is a graft that transplanted from one individual to another of same species.

-**Isograft** : is an Allograft transplanted between two homozygous twins.

3. **Heterograft (xerograft)** : is a graft transplanted from one individual to another of different species



SKIN GRAFT

----- is used for

closure of large wounds

(a wound of one inch width is an indication for graft)

OR

when direct closure may result in deformity.



According to its thickness, skin graft could be classified into two types;

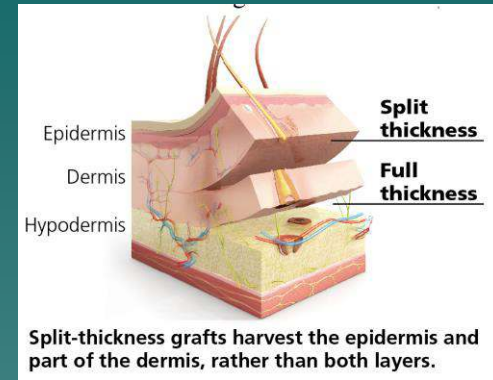
1. **Split thickness skin graft (STSG)** : composed of **epidermis and variable amount of dermis**.

It is harvested by special instrument called **dermatome** (manual skin graft knife or powered dermatome as electric dermatome).

It could be **thin, medium thickness, or thick** graft according to the level at which the dermis is cut.

It is commonly used for closure of extensive wounds as in full thickness burns or traumatic wounds.

Skin of any site of the body could be used as a donor site even the scalp but the most commonly used areas are thighs, buttocks, back.



The donor site usually heal spontaneously by method of partial thickness wound healing process (like that of 2nd degree burn).



It could be used as sheet graft or as mesh graft. Mesh graft is made by put the graft in a special machine that convert the sheet into mesh with slices of different sizes according to the extent of expansion that is suitable for cover a big wound.



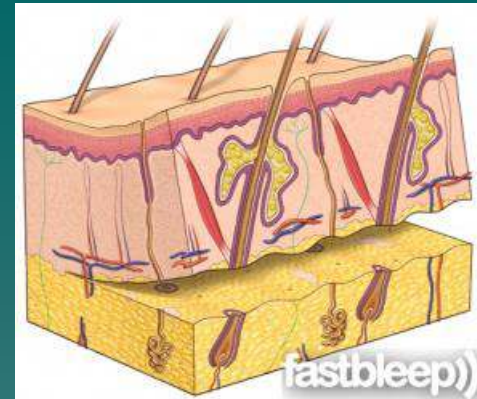
Full thickness skin graft (FTSG):

composed of epidermis and whole thickness of dermis. It is harvested by scalpel.

The donor site should be closed directly or by split thickness skin graft.

It is usually used for closure of wound on the face e.g. after excision of tumor, or closure of wounds on hand e.g. release of contracture of finger.

The most commonly used donor sites are upper eyelid, post and pre auricular area for the wound of the face, and cubital fossa or groin for hand, according to color and texture match.



SKIN GRAFT “take”

Vascularisation of graft is called “take”.

As the skin graft is transplanted from one site to another with complete separation from its circulation at **donor site**, it need to build a new circulation at the **recipient site**.

This needs about 72 hours(the graft takes its nutrient from recipient site by diffusion and plasma imbibitions through the vascular network of the graft during this period).

There three main REQUIREMENTS for skin graft “take”;

1. **Good circulation at recipient site** : dermis, periostium, pericranium, perichondrium, perineurium, paratenon, dura matter, pleura, peritoneum, muscle, healthy granulation tissue, and fat are good recipient sites, while bare bone, bare cartilage, bare nerve, bare tendon, wound covered with poorly grown granulation tissues, and irradiated area are of absent or very poor circulation and are bad recipient sites.

2. Clean wounds : The wound should be free from infection. Infection cause failure of graft as it result in graft necrosis or produce pus that impede Vascularisation of graft.

3. Good contact between the graft and the recipient site : there are two main factors that may interfere with contact;

a. Presence of fluid between the graft & recipient site like blood as hematoma, serous fluid as seroma, or pus.

b. Absence of optimal tension either in excessive tension that result in tenting of graft over concave shape wound, or loose graft with folding that result in facing of its inner surfaces together.

FLAP

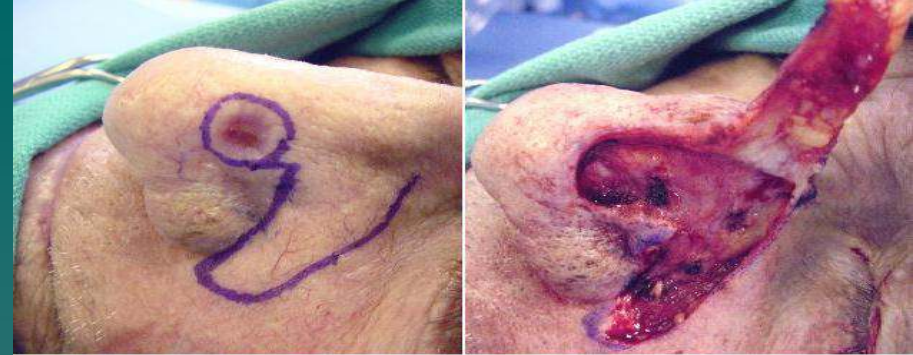
----- It is a piece of tissue that is transferred from one site to another with preservation of circulation passing through one side. Flap base or pedicle is the part through which the circulation pass to the flap, while the body of the flap is called the paddle.



According to the type of base there are three types of flaps;

1. **Peninsular flap** : the flap is attached to the donor site at one side.
2. **Island flap** : all sides of the flap are separated from the donor site, while circulation still in continuity either as isolated vascular bundle or with its surrounding subcutaneous tissue.
3. **Free flap** : the flap is completely separated from the donor site and surgical anastomosis of its vascular pedicle to new vessels at recipient site is done to provide circulation for the flap.

Different types of tissues could be transferred as a flap like skin flap, muscle flap, fascial flap, fasciocutaneous flap (fascia +skin), myocutaneous flap (muscle +skin).



Classification of flap according to type of circulation;

1. Random pattern flap : when the circulation is not well defined i.e. the survival of the flap depends on the dermosubdermal circulation at its base and here the base width has a rule in determining the flap length (the optimal length /width ratio is 1.5/1).

2. Axial pattern flap : The circulation is well defined vessels and the size of the flap will be determined by territory of tissue supplied by that artery (angiosom) and vein (venosom) e.g. **Groin flap**, the vascular pedicle is **superficial circumflex iliac artery** (branch of femoral artery); **Deltpectoral flap**, the vascular pedicle is **2nd & 3rd anterior intercostals arteries** **Dorsalis pedis artery flap** from dorsum of foot.

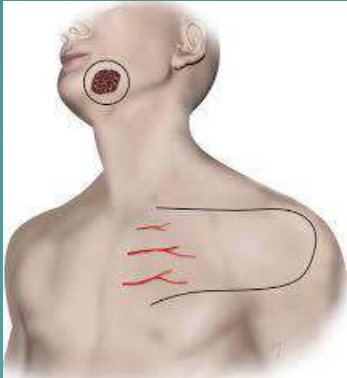
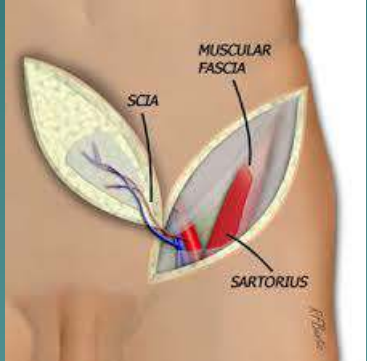
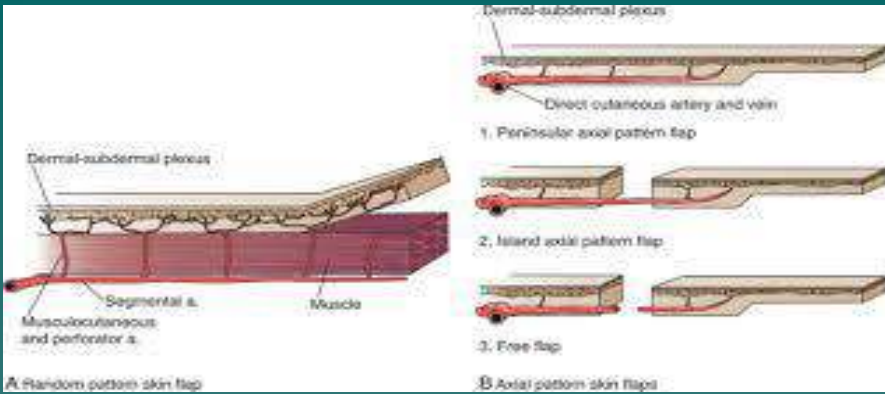


Figure 2. Raising the flap of 12 x 10 cm in dimensions over paratenons without including of extensor tendons.

Classification according to the anatomical site and shapes;

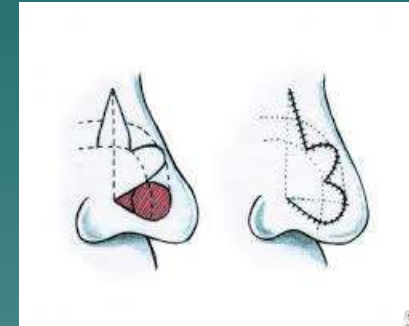
1. **Local flap** is a flap that is used to cover a wound of same anatomical part like flaps used within the nose, finger, cheek, leg, etc---. This could be;

a. **Transposition flap** used to cover a defect in an adjacent site, it may be of different shapes, circular or rectangular or triangular, according the defect size and shape.

b. **Advancement flap** used to cover a defect distally Rectangular advancement flap, V-Y or Y-V advancement flaps.

2. **Regional flap** is a flap transferred within the same anatomical region like defect on nose covered with flap from other parts of the face like cheek as Nasolabial flap or forehead as Forehead flap.

3. **Distant flap** is a flap transferred from one region of the body to another, either as a peninsular(or island) like arm flap used for nose reconstruction, Groin flap for hand wound repair, and cross leg flap, Or as a Free flap with microsurgical vascular anastamosis.



Indications for use of flaps;

- 1. Cover of wounds that are not suitable for graft “take” like exposed bone or cartilage or irradiated wounds.**
- 2. Provide a good cover that facilitate another surgery e.g. bone graft or tendon repair or graft.**
- 3. Reconstruction of anatomical loss as built of lost part of lip, nose, eyelids, ears, scalp, etc---.**
- 4. Functional replacement Temporalis and masseter muscles transfer used for animation of face in facial(CN7) palsy.**
- 5. Treatment of infection muscle flap are used for covering an exposed bone with osteomyelitis.**

Z-plasty

is a surgical technique plane in a shape of the letter Z in which the three limbs are equal in length, the two peripheral limbs are usually parallel and the angles between the central and the peripheral limbs are 60. Incisions made at limbs of the Z and two triangular flaps are elevated and transposed in place of another, this will result in rotation of Z by 90 degree. This will provide an extra length of tissue and change in direction of present scar, so the indications for Z-plasty are;

1. **lengthening of skin or scar** as in release of linear scars and contractures.
2. **Redirection of scar** to put it within or parallel to the anatomical or skin lines.
3. **Reconstruction of anatomical structure** like cleft lip repair.

