PLASTIC & RECONSTRUCTIVE SURGERY

LEC3

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اختصاص الجراحة التقويمية

BASIC PRINCIPLES IN PLASTIC SURGERY

Definitions:

Plastic as a word came from a Greek word plastikos which means remold or reform.

Plastic as an adjective = capable of being shaped or formed.

Is a branch of surgery that deals with remold, repair& restore body parts. Unlike other surgical specialties, plastic surgery is not organized around a specific organ system so it is based on principles rather than specific surgical procedures. It is divided into 2 main parts:

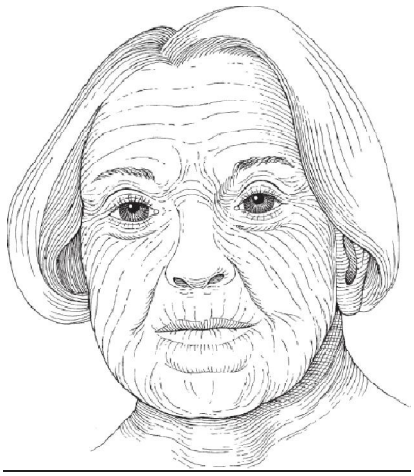
1.Cosmetic(aesthetic)plastic surgery:*That deals with reshaping the normal structures of the body to improve the patients appearance e.g. rhinoplasty, abdominoplasty, facelift,...etc.*

2.Reconstructive plastic surgery: *That deals with repairing or reshaping(reconstructing) the acquired or congenital abnormalities e.g. reconstructing cleft lip, cleft palate, traumatic wounds, burn deformities,...etc.*

OBTAINING A FINE-LINE SCAR

The final appearance of a scar is dependent on many factors including the following:

1. Differences between individual patients: Oily or pigmented skin produces more unsightly scars Thin, wrinkled, pale, dry, skin usually results in less conspicuous scars.
2. location on the body: Certain anatomic areas tend to produce unfavorable scars that remain hypertrophic or wide. The shoulder and sterna area are such examples. Conversely, eyelid incisions almost always heal with a fine-line scar.
3. Age of patient: scars less obvious and less prone to widening in older individuals. Children, on the other hand, may heal faster but do not heal "better," in that their scars tend to be red and wide when compared with scars of their grandparents.
4. The tension on the closure.
5. the direction of the wound: Elective incisions or the excision of lesions are planned when possible parallel to the relaxed skin tension lines. Wrinkle lines are generally the same as the relaxed skin tension lines and lie perpendicular to the long axis of the underlying muscles. Incisions and scars can be "hidden" by placing them at the junction of aesthetic units (e.g., at the junction of the lip and cheek and along the nasolabial fold)
6. The shape of the wound also affects appearance
7. local and systemic conditions: Local conditions, such as crush injury of the skin adjacent to the wound, also affect the scar. So, too, with systemic conditions such as vascular disease *or* congenital conditions affecting elastin and/or wound healing.
8. Surgical technique: Minimizing damage to the skin edges with atraumatic technique, debridement of necrotic *or* foreign material, and a tension-free closure are the first steps in obtaining a fine-line scar. Two technical factors are of definite importance in increasing the likdihood of a "good" scar:
   First is the placemen of sutures that are not excessively tight and are removed promptly.
   second is wound-edge eversion.



Relaxed skin tension lines

CLOSURE OF SKIN WOUNDS:

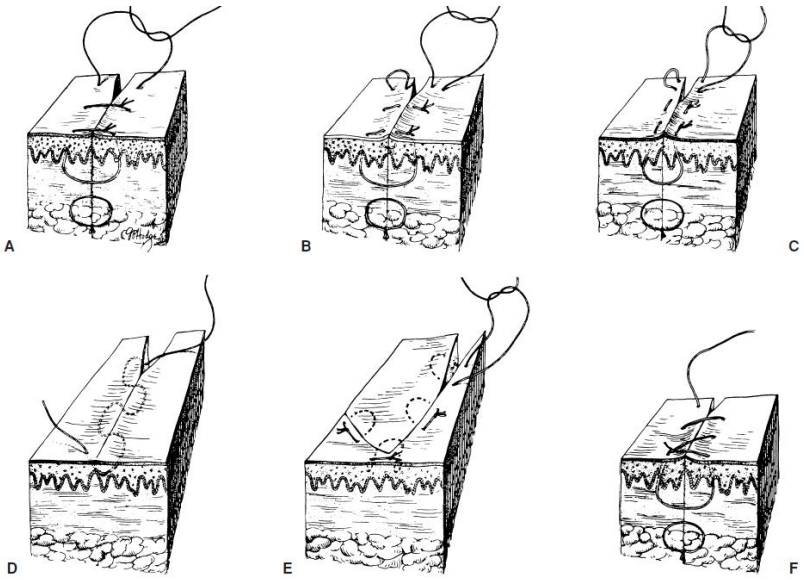
While the most common method of closing a wound is with sutures, there is nothing necessarily magic *or* superior about sutures. Staples, skin tapes, *or* wound adhesives are also useful in certain situations.

- Wounds that are deeper than skin are closed in layers
- Not all layers necessarily require separate closure
- dermal sutures, placed with the knot buried to prevent it from emerging from the skin during the healing process,
- Buried dermal sutures provide strength so the external sutures am be removed early, but do not prevent the scar from spreading over time.
- Sutures on the face can usually be removed in 3 to *5* days and on the body in 7 days or less. Except for wounds over joints, sutures should rarely be left in for more than 1 week.
- Precise approximation of the skin edges without tension is essential to ensure primary healing with minimal scarring.

1. Suturing Techniques:

- Simple Interrupted Suture. The simple interrupted suture is the gold standard and the most commonly employed suture.
- Vertical Mattress Suture. Vertical mattress sutures may be used when eversion of the skin edges is desired and cannot be accomplished with simple sutures alone.
- Horizontal Mattress Suture. They are particularly advantageous in thick glabrous skin (feet and hand). Also used when eversion of the skin edges is desired.
- Subcuticular Suture Such a technique obviates the need for external skin sutures and circumvents the possibility of suture marks in the skin.
- Half-Buried Horizontal Mattress Suture. Half-buried horizontal mattress sutures are used when it is desirable to have the knots on one side of the suture line with no suture marks on the other side.
- Continuous Over-and-Over Suture

2. **Skin Staples**. Skin staples are particularly useful as a timesaver for long incisions
3. **Skin Tapes**. Skin tapes can effectively approximate the wound edges, although buried sutures are often required in addition to skin tape to approximate deeper layers, Skin tapes can also be used after skin sutures are removed to provide added strength to the closure.
4. **Skin Adhesives**: may have a role in wound closure, especially in areas where there is no tension on the closure, or where strength of closure has been provided by a layer of buried dermal sutures.

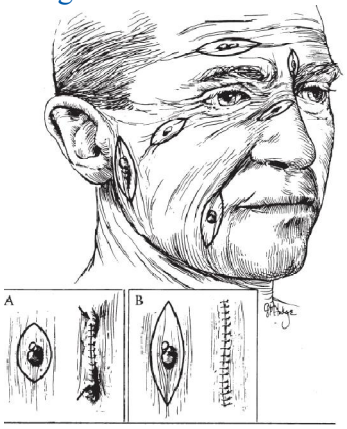


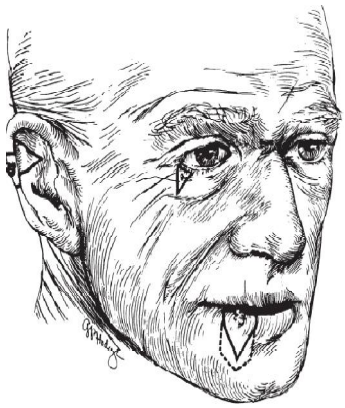
Methods of Excision:

Lesions of the skin can be excised with *elliptical, wedge, circular,* or *serial excision.*

Elliptical Excision: Correct method with length of ellipse at least three times the width. If the ellipse is too short, dog-ears form at the ends of the closed wound.

Wedge Excision. Lesions located at or adjacent to free margins can be excised by wedge excision





Circular Excision. When preservation of skin is desired (such as the tip of the nose)

Serial Excision. Serial excision is the excision of a lesion in more than one stage.

Abnormal wound healing:

1. Excessive Scar Formation: : in a form of keloids or hypertrophic scars.

Keloids: *scar tissue that extends beyond the boundaries of the incision or wound, may develop months to a year after injury, and do not resolve spontaneously. Common in ear lobes, presternal area, shoulders and areas of tension.*

Hypertrophic scars: *scar tissue that does not extend beyond the boundaries of the incision or wound, develop within weeks of wounding (during the inflammatory phase), and there is usually some degree of improvement with time*

Hypertrophic scars (HTS)

• Scar elevated but **within borders of original scar;** more common than keloids (5%-15% of wounds)

 Predisposition to areas of tension, flexor surfaces

 Less recurrence following excision and adjuvant therapy

Keloid scars

• **Grow outside original wound borders**

• Only seen in humans; rare in newborns or elderly

 Genetic and endocrine influences (increased growth in puberty and pregnancy)

 Rarely regress and more resistant to excision and therapy

• Because of high recurrence rates, **multimodality therapy recommended**

Treatment:

1. Time: Time will improve most scars, and sufficient time should elapse for the 3rd phase of wound healing (maturation) to run its full course before a scar is considered for revision.
2. Pressure therapy:
1. Silicone sheeting or gel : Hydration, increased temperature .used for 3 months.
2. Intralesional Corticosteroids: Reduce collagen synthesis and inflammatory mediators
3. Interferon :Reduce fibroblast production of glycosaminoglycans, increase collagenase
4. 5-Fluorouracil: Inhibits fibroblast proliferation
5. Cryotherapy :Modifies collagen synthesis and fibroblast differentiation
6. Excision: Removal of abnormal tissue
7. Radiation: Inhibition of angiogenesis and fibroblasts

Scar revision: surgical procedure to improve scar. It should be done at least after 6 months to allow maturation of wound. There are many options for scar revision:

1. Scar excision and direct suture.
2. Serial excision
3. revised with Z-plasty or W-plasty.
4. large scar excised and the wound resurfaced with a skin graft or a skin flap,
5. dermabrasion has a role in the management of specific types of scar (acne scar)

2. Inadequate Scar Formation:

Chronic or nonhealing wounds are open wounds that fail to epithelialize and close in a reasonable amount of time. These wounds are clinically stagnant and do not show signs of further closure. The many reasons why such wounds do not heal can be broadly related to:

- aging and decreased cellular function;
- ischemia-reperfusion injury;
- bacterial colonization

Clinical factors affecting repair

Local factors	Systemic factors
local ischemia. edema. infection. radiation. foreign body. pressure.	D.M. malnutrition. chemotherapy. steroids. smoking. immunocompromized state. aging process.

Examples : diabetic foot ulcers, pressure sore, and venous stasis ulcers.
Diabetic ulcers occur because of defects in the inflammatory and proliferative phases of wound healing. In contrast, wounds occurring because of vitamin C depletion (i.e., scurvy) are due to abnormal collagen cross-linking, which occurs during the remodeling phase of wound healing.

ADJUNCTS TO WOUND CARE:

Optimize systemic parameters:

- control blood sugar
- Stop smoking

Debridement:

Debridement is defined as the removal of non-vital tissue, foreign material and bacteria from an acute or chronic wound. There are many methods of wound debridment:

- Surgical debridement: This involves the use of instruments (scissorss, scalpels) to remove necrotic tissue from the wound.
- Mechanical debridement: Small amounts of necrotic tissue can be physically removed by using wet-to-dry dressings wound irrigation and whirlpool techniques.
- Enzymatic debridement: achieved by topical application of exogenous proteolytic enzymes such as collagenase to the wound surface
- Autolytic debridement: accomplished by moist interactive dressings. They allow the natural wound fluid and its enzymes to soften and liquefy slough and promote granulation.
- Biological debridement: Biological debriding agents, such as maggots, are an effective alternative to surgical debridement in patients who cannot go to the operating room for medical reasons.

Edema and exudates control:

- Compression
- Elevation

Infection control:

Wounds may be considered *contaminated* (bacteria present without proliferation), *colonized* (bacteria present and multiplyingwithout overt host reaction), or *infected* (expanding bacterial quantity with ongoing host reaction).
*A quantitative culture of 10*5 bacteria per gram of tissue is usually diagnostic of an infection*.
signs of overt wound infection include decreases rate of healing in any wound, increasing pain in the periwound area, increased wound edema, cellulitis, malodorous discharge, increased drainage, or purulence..
Systemic antibiotics are unnecessary for most wounds. However, there are settings where systemic antibiotics are important:

1) any wound that is show signs of infections as mentioned above.
2) wounds contaminated by oral flora or animal bites,
3) in patients with mechanical implants
4) immunocompromized and diabetic patients

In general, surface irrigation and lavage with saline may be all that is necessary for truly contaminated wounds, whereas topical antibiotics and surgical debridement are often essential management tools for overtly infected wounds

Dressings: Functions of dressings include:
(a) protection, (b) absorption, (c) compression, (d) immobilization, and (e) provision of an aesthetic wound covering

TYPE OF DRESSINGS

A. Nonocclusive dressings (e.g., Gauze): Permeable to both gas particles and fluids.

"Wet to dry" dressing: Allowing the gauze to dry prior to removal results in mechanical debridement of the wound during each dressing change..

"Wet to wet" dressing: Used over exposed tendon, bone, and neurovascular structures to minimize desiccation.

B. Semiocclusive dressings (e.g., Tegaderm)

1. Sheet dressings that are impermeable to fluids but allow passage of gas molecules.
2. Usually used to cover graft donor sites to keep area moist.
3. Must be cautious in using on areas of thin/fragile skin.
4. Should not be used in contaminated wounds.

C. Occlusive dressings

1. Hydrogel (e.g., Aquasorb and Hydrosorb)
- Composed of complex polysaccharides, nonadhesive
- Use in wounds with mild exudative wound and in painful wounds.
- Can be used in infected wound beds.

2. Hydrocolloids (e.g., Duoderm)
- Comes in paste, powder, and sheet forms
- Fully adhesive, minimally absorptive
- Cannot use in infected wounds
- Use in mild to moderate exudative wounds

3. Foam (e.g., Mepilex)
- Usually composed of nonadhering polyurethane
- Highly absorptive, but nonhydrating
- Use in moderately to heavily exudative wounds

4. Alginates (e.g., Algiderm)
- Can absorb 20× the dry weight of the dressing
- Use in highly exudative wounds

D. Antimicrobial dressings

Silver-coated or -impregnated dressings (e.g., Silverlon)

E. Negative pressure wound therapy(NPWT) OR Vacuum assisted closure (VAC)
- ❖ Consists of using a sponge, occlusive dressing, and vacuum
- Reduces edema
- Removes exudates from leaky blood vessels/lymphatic channels to improve oxygen diffusion
- Removes harmful enzymes and inflammatory mediators

Most commonly used in:
- Venous stasis ulcers
- Lymphatic leaks
- Diabetic wounds

Must not use over:
- Infected tissues
- malignant wound
- Inadequately debrided wounds
- Neurovascular structures
- Ischemic wound

Hyperbaric Oxygen: (typically, 100% O2 saturation at 2 to 3 ATA) raises the dissolved oxygen saturation in plasma from 0.3% to nearly 7%. This rise in oxygen increases the interstitial diffusion distance of oxygen four- to fivefold.

Growth Factors: platelet-derived growth factor (PDGF) or becaplermin used in the treatment of diabetic foot ulcers.

Enzymes: collagenase which works by digesting necrotic collagen within wounds.