

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



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﴿وَلَقَدْ اسْتَفْهَمْنِي بِرُسُلٍ مِّن قَبْلِكَ
فَأَفْلَيْتُهُ لِلَّذِينَ كَفَرُوا ثُمَّ أَخَذْتُهُمْ
فَكَيْفَ كَانَ عِقَابِ﴾

صدق الله العظيم

سورة الرعد - آية (32)

Wounds and wound healing

By

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wounds

■ Definition:

Any damage or injury of tissue, whether it be a breach of continuity of the skin, rupture of an internal organ, fracture of a bone, burn, scald or otherwise.

Types of wounds

■ Legal classification:

1- Simple wounds:

- Neither extensive nor serious.
- Heal in less than 20 days.
- Leaving no permanent infirmity.

2-Dangerous wounds:

- Either extensive or serious.
- Require prompt surgical interference.
- Heals in more than 20 days or in less but leaving permanent infirmity.

3- Fatal wounds:

- Immediately or within short time cause death.
- Involving the heart or large blood vessels, the brain, upper part of spinal cord,.....etc.

■ Medico-Legal classification:

(A) Closed Wounds: (skin remain intact)

1- Abrasions:

- Scraping away of superficial layer of skin by rough surface.
- Painful, red and tender raw surface oozing serous or serosanguineous fluid.

2- Contusions (Bruises or Echymosis):

- Extravasations of capillary blood in subcutaneous tissue by blunt trauma.
- Painful swollen red at first then blush then brownish or greenish yellow.

3- Haematoma:

- Localized collection of extravasated blood in the tissue planes due to rupture of blood vessels.
- Painful, tender cystic swelling then clot within hours, later will liquefy.

sub types of haematoma:

- Subcutaneous.
- Subfascial.
- Intra- muscular.
- Extra- cranial.
- Intracranial.
- Retroperitoneal.
- Sub diaphragmatic
- Subungal.
- Haemosrotum.
- Haemoarthrosis.

Types of wounds

(B) Open Wounds: (skin is interrupted)

1- Incised wounds

- Painful clean cut wound caused by sharp instrument..
- Bleeds profusely, BVs & nerves may be injured.

2- Lacerated wounds (Contused):

- Caused by sever violence with blunt object e.g. RTA.
- Irregular in shape, the tissues are severely traumatized & devitalized.
- Contaminated & infection very likely to occur.
- Varieties of contused wounds:
 - Torn wounds (degloved or avulsed).
 - Crush wounds.
 - Bites: animal or human.

Types of wounds

3- Stab wounds:

- Caused by thrusting of a sharp pointed instrument.
- Small but deep with great liability of injury to internal organs.
- Varieties of stabbing:
 - Punctured wounds e.g. by nail.
 - Penetrating i.e.. Reach body cavity.
 - Transfixing wounds e.g. by swards.

4- Missile wounds:

- Are very serious as the bullet transmits its high kinetic energy to the tissues.
- High velocity missile injury (rifles) are more serious than low velocity one.

■ Operative classification: SSI

1- Clean wounds:

- Elective, primarily closed, & undrained.
- Nontraumatic, no inflammation encountered.
- Respiratory, alimentary, genitourinary, or oropharyngeal tracts not entered.

2- Clean contaminated :

- Respiratory, alimentary, genitourinary, or oropharyngeal tracts entered with minimal contaminations e.g. appendectomy.
- mechanical drainage. - minor break in asepsis.

■ Operative classification:

3- Contaminated wound:

- Open fresh traumatic wounds.
- Incision in which acute non purulent inflammation is present
- Major break in the techniques.

4- Infected & Dirty wounds :

- Traumatic wound with retained FB, devitalized tissues, fecal contamination.
- Perforated viscus encountered.
- Acute bacterial inflammation with pus during operation.

Complications of wounds

A) General complications:

- 1- *Hemorrhage:*
- 2- *Shock:*
- 3- *Embolism.*
- 4- *Crush syndrome .*
- 5- *Asphyxia.*

B) Local complications:

- 1- *Bleeding.*
- 2- *Injury of important structures.*
- 3- *Retained FB.*
- 4- *Infection .*
- 5- *Complication of wound healing.*

Treatment

Of open wounds

First aid treatment

1. Arrest bleeding
2. Dressing
3. Splinting
4. transfer

Preoperative treatment

1. Correction of shock
2. Prevention of infection
3. Assessment of the patient.

operation

Clean wound: direct suturing

Contaminated wound:

1. debridement+ primary suturing
2. debridement+ delayed primary suturing after 5 days
3. Debridement+ secondary suturing or grafting

Prophylaxis of wound infection

1-rigid aseptic precautions

- Operating room sterilization
- Staff sterilization
- patient preparation

2- proper surgical technique

- Hemostasis
- Avoid undue trauma to tissues
- Avoid undue cautery

Support body defenses

- Blood transfusion
- Proper nutrition
- Vitamins& electrolytes disturbances

Prophylactic antibiotics

- Within 2 hours before operation, best with induction of anaesthesia
- Repeated doses for one or two days post operative according to the situations

Treatment of wound infection

1. Drainage: the wound is widely opened
2. Wound irrigation with saline
3. Local antiseptics & antibiotics
4. Repeated dressings
5. Systemic suitable antibiotics

Wound Healing

- **Definition:**

It is the process of replacement of destroyed tissues by living tissues.

Types of wound Healing:

1- Primary Healing (Healing by 1st Intention):

- Healing by immediate coverage with epithelial elements..
- It occurs when the wound is closed by direct approximation of the edges by sutures.

2-Secondary Healing (Healing by 2nd Intention):

- Leaving the wound open and allowing it to heal spontaneously.
- Its component:
 - Wound contraction
 - Granulation tissues formations.
 - Epithelization.

3- Tertiary healing:

- It means closure of the clean granulating open wound after a delay of days or weeks by sutures before it healed.
- This process interrupts the 2ry healing process.

Stages of wound Healing:

1- Inflammatory Phase:

- Shortly after wounding inflammatory cells invade the wound area.
- Mainly PMNs, Monocytes which evolve into macrophages.

2-Proliferative Phase:

- Begins hours after injury & extends for weeks.
- The main cells is the fibroblast (makes collagen).
- Neo vascularization + Fibroblast = Granulation tissue formation and start of epithelialization.

3- Maturation (Remodeling) phase:

- It means maturation of collagen and re-orientation of fibers across the wound..
- This process interrupts the 2ry healing process.

■ Factors affecting wound healing:

(A) Factors related to the patients

1- General factors:

- a- Age: younger patients have faster healing.
- b- Nutrition: ↓ albumin, vitamin C and zinc.
- c- Hormones: corticosteroid impair wound healing.
- d- Chronic illness: DM, uremia , Cancer, Cirrhosis impair healing.

2- Local Factors:

- a- Blood supply at the site of the wound.
- b- Infection: FB & infection delay wound healing.
- c- Movement:
- e- Irradiation

- Factors affecting wound healing:

(B) Factors related to the Surgeon:

- a- Perfect surgical technique i.e. no tension on suture & good hemostasis.
- b- Direction of the wound i.e. Langer's fibers .
- c- Poor apposition of the tissues.
- d- Suture material
- e- Local wound care and Local or systemic antibiotics.

■ Complications of wound healing:

- 1- Infection.
- 2- Wound failure: wound dehiscence, burst abdomen or incisional hernia .
- 3- Painful scar: due to neuroma as in amputation.
- 4- Hypertrophic scar: It is a raised itchy red thickened scar which remain within the confines of the wound.
- 5- Keloid Formation: It is Raised thickened scare that grows beyond the margin of the original wound.
- 6- Contracture & Cicatrisation.
- 7-Implantation dermoid cyst.
- 8- Pigmentary changes.
- 9- Gangrene.
- 10- Marjolin Ulcer: predispose to sq.c.c.

Thank You