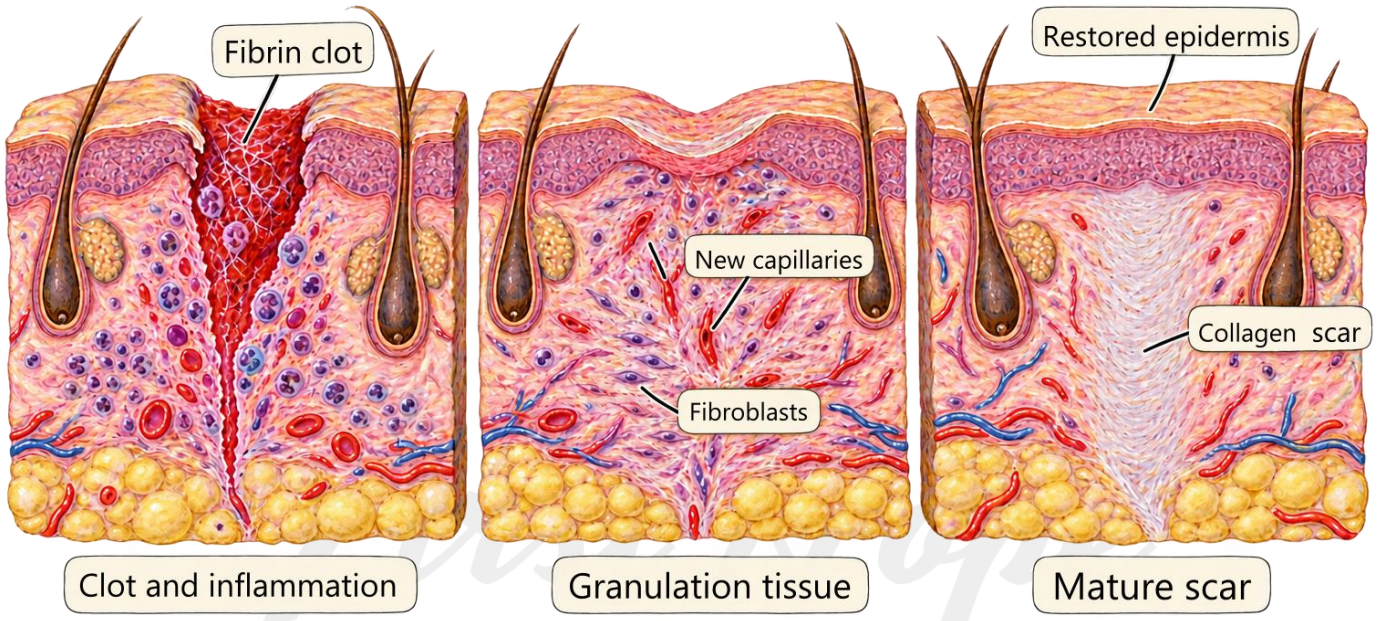
General Surgery - Topic 5 - Wound healing and wound care

Normal Wound Healing

Meaning

- A wound is a break in the continuity of tissue caused by injury, an operation or disease.
- Healing restores the tissue barrier through overlapping inflammatory, proliferative and remodelling processes.
- The final result depends on the tissue, depth, blood supply, contamination and general health.



Clot formation, granulation tissue and collagen remodelling restore the skin barrier

Phases of Normal Wound Healing

1. Haemostasis and Inflammation

A. Early Clot and Framework

- Vasoconstriction, platelet aggregation and coagulation produce an early clot that limits bleeding.
- The fibrin clot also provides a temporary framework for cells entering the wound.

B. Inflammatory Cells and Repair Signals

- Neutrophils arrive early to remove microbes and debris, while macrophages later coordinate repair.
- Macrophages release signals that promote new vessels, fibroblast activity and matrix formation.

C. Expected Inflammation and Infection Warnings

- Some early redness, warmth and tenderness are expected, but progressive or spreading changes suggest a complication.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

2. Proliferation

A. Granulation Tissue

- Fibroblasts produce extracellular matrix and collagen that begin to bridge the wound.
- New capillaries enter the wound and form vascular **granulation tissue** with fibroblasts and loose matrix.

B. Epithelialisation and Contraction

- Epithelial cells migrate across a suitable moist wound surface to restore the epidermal barrier.
- Myofibroblasts contract the wound, especially when a large tissue gap remains.
- Granulation tissue is a normal repair tissue and is different from a granuloma.

3. Remodelling

- Collagen is reorganised and cross-linked as the scar gains strength over months.
- Early type III collagen is gradually replaced by a greater proportion of type I collagen.
- The scar becomes less vascular and usually paler as it matures.
- A healed scar does not regain the full strength of uninjured skin.

Patterns of Healing



Pattern	What happens	Typical consequence
Primary intention	Viable wound edges are brought together early.	There is usually less granulation tissue and a smaller scar.
Secondary intention	A tissue gap remains open and fills through granulation, contraction and epithelialisation.	Healing is slower and contraction is greater.
Delayed primary closure	The wound is initially left open, then closed after reassessment shows that it is suitable.	This allows contamination or tissue viability to be assessed before closure.

- The closure plan depends on tissue viability, contamination, infection risk and the amount of tissue lost.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

- A contaminated wound should not be forced closed simply to produce an early cosmetic result.
- Delayed primary closure is considered only after reassessment confirms a suitable clean wound.

Factors That Delay Healing

1. Local Factors

- Infection prolongs inflammation and can destroy newly formed tissue.
- Poor arterial supply, oedema and excessive tension reduce oxygen delivery or damage the wound edges.
- Foreign material, dead tissue and a haematoma can support infection and prevent healthy tissue contact.
- Repeated pressure, friction or movement can disrupt healing.
- Previous radiotherapy can damage vessels and reduce tissue repair capacity.

2. General Factors

Nutrition and Metabolic Disease

- Protein-energy malnutrition reduces the materials available for tissue repair.
- Diabetes can impair immunity, circulation and sensation, especially when glucose control is poor.

Oxygen Delivery and Immunosuppression

- Smoking reduces tissue oxygenation and increases several postoperative complications.
- Anaemia, hypoxaemia and severe systemic illness may compromise wound oxygen delivery.
- Corticosteroids and other immunosuppressants can interfere with inflammation and repair.

Correcting Proven Deficiencies

- Correct demonstrated nutritional deficiencies, but do not assume that high-dose supplements improve every wound.

Assessment and Classification

History of a Wound

The Injury and Its Progress

- Record the time, mechanism, object involved, location and likely contamination.
- Ask about pain, bleeding, numbness, weakness, discharge, fever and change in wound size.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

- Identify a possible retained foreign body, bite, injection, crush injury or high-pressure injection.
- A high-pressure injection injury can have a small entry wound but extensive deep damage and needs urgent specialist review.
- Record previous cleaning, dressings, sutures, antibiotics and the response to treatment.

Background Risks

- Ask about diabetes, vascular disease, immune suppression, allergies, anticoagulants and smoking.
- Check tetanus immunisation and consider rabies exposure after relevant animal bites.
- For a chronic ulcer, ask about recurrence, pressure, footwear, mobility and previous vascular treatment.
- Record occupation, functional needs and available support for dressing and follow-up.

Examination and Presentation

1. Initial Assessment and Preparation

- Assess the whole patient first when there is major trauma, bleeding or systemic illness.
- Provide analgesia, explain the examination and expose the affected area with privacy and consent.

2. Wound and Neurovascular Examination

- Describe the wound site, number, length, width, visible depth, edges, base and surrounding skin.
- Record contamination, devitalised tissue, discharge, odour, swelling and signs of spreading infection.
- Examine distal circulation, sensation, movement and relevant tendons before local anaesthesia when possible.

3. Safe Exploration and Case Presentation

- Explore a wound only with adequate anaesthesia, lighting, haemostasis and appropriate expertise.
- Do not probe blindly near vessels, nerves, joints or a penetrating body-cavity wound.
- Present the mechanism, timing, wound findings, structural damage, infection risk and proposed plan clearly.

Types of Wounds

1. Classification by Mechanism

A. Incised Wounds

- An **incised wound** is produced by a sharp edge and often has relatively clean margins.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

- Even a narrow clean-looking incision can injure deeper tendons, nerves or vessels, so function and perfusion must be checked.

B. Lacerations

- A **laceration** results from tearing and may have irregular, bruised or devitalised edges.
- The extent of devitalised tissue influences debridement and whether immediate closure is appropriate.

C. Abrasions

- An **abrasion** is a superficial loss of skin caused by friction.
- Cleaning must remove embedded dirt while avoiding unnecessary injury to viable tissue.

D. Puncture Wounds

- A **puncture wound** has a small surface opening that can conceal deep contamination.
- A retained foreign body or deep-space infection should be considered when pain or swelling persists.

E. Crush and Avulsion Wounds

- A **crush or avulsion wound** may damage the blood supply and leave a larger area of threatened tissue than is initially visible.
- Repeated assessment may be necessary because tissue viability can become clearer over time.

F. Bite Wounds

- Bites combine tissue injury with contamination by saliva and require exposure-specific assessment.
- Management includes assessment of structural injury, infection risk, tetanus status and possible rabies exposure.

2. Classification of Operative Wounds

Class	Meaning	Example
Clean	There is no infection and no entry into a colonised viscus.	An uncomplicated elective hernia repair is usually clean.
Clean-contaminated	A colonised tract is entered under controlled conditions without unusual contamination.	An uncomplicated elective bowel operation may be clean-contaminated.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

FREE PREVIEW

Click here to visit our website

MBBS PREMIUM NOTES

Complete MBBS notes for every subject and year are available only in the FirstHope app.

Scan or click here

Click here to get the app >

Available on Google Play

Browse MBBS notes by year

firsthope.co.in/mbbs

Click here to explore MBBS >

Scan or click here

FirstHope Medical on Instagram

@firsthope.medical

Click here to follow

App and notes help

Find answers about access and downloads

Click here for help

YEAR 1 / YEAR 2 / YEAR 3 / YEAR 4