

Chapter 2

Wound Healing

CHAPTER OBJECTIVES

1. Describe the vascular response of inflammation.
2. State the cells involved in the inflammatory phase and describe their functions.
3. Describe the proliferative phase of wound healing.
4. State the cells involved in the proliferative phase and describe their functions.
5. Describe the maturation and remodeling phase of wound healing.
6. Differentiate between wound closure by primary, secondary, and delayed primary wound closure.
7. Compare and contrast absence of inflammation and chronic inflammation.
8. Explain why absence of inflammation and chronic inflammation occur and interventions that may improve wound healing.
9. Compare and contrast hypogranulation and hypergranulation.
10. Explain why hypogranulation and hypergranulation occur and interventions that may improve wound healing.
11. Compare and contrast hypertrophic scarring, keloids, contractures, and wound dehiscence.
12. Explain why hypertrophic scarring, keloids, contractures, and wound dehiscence may occur and interventions that may improve wound healing.

KEY TERMS

| | |
|-------------------------|--------------------------------|
| Abrasion | Fibroblast |
| Angioblasts | Granulation tissue |
| Angiogenesis | Growth factors |
| Chemotactic agents | Healed wound |
| Chemotaxis | Hypergranulation |
| Closed wound | Hypertrophic scarring |
| Collagenases | Hypogranular |
| Contracture | Inflammation |
| Current of injury | Integrins |
| Cytokines | Keloids |
| Cytotoxic agents | Macrophages |
| Dehiscence | Margination |
| Delayed primary closure | Mast cells |
| Diapedesis | Matrix metalloproteases (MMPs) |
| Epibole | Maturation/remodeling |
| Epithelialization | Myofibroblasts |
| Exudate | Platelets |

Polymorphonuclear neutrophils (PMNs)
Primary closure
Proliferation
Prostaglandins
Scab

Secondary closure
Tissue inhibitors of matrix metalloproteases
(TIMPs)Transudate
Wound contraction

CHAPTER OUTLINE

I. Introduction

II. Phases of Wound Healing

- A. Inflammation
 - 1. Vascular response
 - 2. Cellular response
- B. Proliferation
 - 1. Angiogenesis
 - 2. Granulation tissue formation
 - 3. Wound contraction
 - 4. Epithelialization
- C. Maturation and remodeling

III. Types of Wound Closure

- A. Primary closure
- B. Secondary closure
- C. Delayed primary closure

IV. Abnormal Wound Healing

- A. Absence of inflammation
- B. Chronic inflammation
- C. Hypogranulation or nonadvancing wound edge
- D. Hypergranulation
- E. Hypertrophic scarring
- F. Keloids
- G. Contractures
- H. Dehiscence

DISCUSSION POINTS

1. Why is a wound likely to recur in the same location as a previous ulcer?
2. How can inflammation be both beneficial and problematic?
3. Why are inflamed wounds characterized by local redness, heat, swelling, pain, and decreased function?
4. When looking at an open wound, how might you be able to tell that the wound is primarily in the proliferative phase of wound healing?

5. You have been working with a 6-year-old patient with deeply pigmented skin who sustained a full-thickness burn covering 75% of his upper extremity. The burn wound is now closed. What information would you provide to an insurer about the patient's wound healing and impairments to justify the patient's requirement for continued physical therapy?
6. How are chronic wounds different from acute wounds?

TEACHING TIPS

1. Using some of the images of patients with open wounds, have the students determine the primary phase of wound healing for each wound. Ensure that the students describe particular characteristics, such as the presence of granular budding or epithelialization.
2. Make a list of all of the cells involved in wound healing. Ask the students to describe their key functions and what phase(s) these functions occur in.
3. Have students group the various types of abnormal wound healing listed within the chapter by the phase of inflammation.
4. Have students use the chapter objectives to assess their understanding of the information provided.
5. Have students define a sampling of the key terms provided. Students may check their answers either within the chapter or by using the Glossary in Appendix A.