PHASES OF HEALING
Mandatory Knowledge

LEARNING OBJECTIVE
• Understand Phases of Healing in Musculoskeletal Trauma

LEARNING OBJECTIVE
• Apply Phases of Healing knowledge in the evaluation and treatment of musculoskeletal complaints / injuries
LEARNING ACTIVITY

Patient is 9 months status post MVC with chronic cervicothoracic pain and headaches. The patient has undergone 4 months of passive modalities, spinal manipulation and myofascial release. He has also undergone 2 months of acupuncture.

• Think of a relevant treatment plan or referral for this individual.

WOUND HEALING

• Body's replacement of destroyed tissue by living tissue (Walter and Israel, 1987).
• Two Essential Components:
  - Regeneration
  - Repair

REGENERATION

• Specialized tissues are replaced by the proliferation of surrounding undamaged specialized cells.

REPAIR

• Lost tissue is replaced by granulation tissue which matures to form scar tissue.
PHASES OF HEALING

- Phase – A distinct period or stage in a process of change or forming part of something’s development.
- Healing – The process of returning to health: the restoration of structure and function of injured or diseased tissues.

PHASES OF HEALING

- Phase I: Acute Inflammatory Phase
  - 24-72 Hours
- Phase II: Repair Phase
  - 2-6 Weeks
- Phase III: Remodeling Phase
  - Up to 40 Weeks
  - Does not indicate that treatment should be continued for up to 40 weeks. This does mean that each phase should be completed to aid eventually transitioning into a home-based stretching/strengthening program.

BLEEDING PHASE

- Short lived phase following trauma
- More vascular tissues (e.g., muscle) will bleed longer than less vascular tissues (e.g., ligaments) in terms of duration and volume.
INFLAMMATORY PHASE

- Rapid Onset
- Zenith of inflammatory response occurs between 3-72 hours.
- Characterized by pain, swelling, redness and localized increased temperature.

REPAIR / PROLIFERATION PHASE

- Generation of repair material
- Involves production of scar (collagen) material
- Rapid onset (24-48 hours)
- Peaks between 2-3 weeks
- Bulk of scar tissue formed

REMODELING PHASE

- Often overlooked
- Should result in organized and functional scar which is capable of behaving in a “similar” way to the parent tissue.
- Typically starts at peak of proliferation phase (2-3 weeks)
- Continues up to 40 weeks
PHASES OF HEALING
ACUTE INFLAMMATORY

Vascular and Cellular Events
- Increased vessel caliber (blood flow) and vessel permeability.
- Electrolytes, proteins, leukocytes, monocytes and neutrophils
- Swelling causes pressure on nerves, resulting in pain response.
- Neutrophils and polymophonucleocytes (PMNs) are “first responders” and begin phagocytic processes.
- Monocytes (macrophages), along with the edema act as the “clean up crew” and remove debris.
- Extent of response is proportional to the severity of injury.

PHASES OF HEALING
ACUTE INFLAMMATORY

Treatment
- PRICE – Protect, Rest, Ice, Compress, Elevate
- NSAID Therapy
- Physiotherapy Modalities
  - Interferential current (acute)
  - Cryotherapy (2-5 days)

PHASES OF HEALING
REPAIR (REGENERATION) PHASE

- Involves the formation of collagen, which bridges the gap created by necrosis of tissue.
- Scar tissue
- Adhesions
- Typically lasts up to 6 weeks and is dictated by severity of the injury.
PHASES OF HEALING

REPAIR (REGENERATION) PHASE

Treatment

• Manual Manipulation
• Intra-articular adhesions
• Deep Tissue Myofascial Release
• Extra-articular / Myofascial Adhesions
• Passive modalities
  • Interferential Current (subacute)
  • Heat / Ice Contrast
  • Progressing to Moist heat

REMODELING PHASE

• Importance of this phase is often overlooked by practitioners.
• Does not occur or resolve quickly, may last up to 1 year.
• Appropriate treatment results in more organized and functional scar tissue.
• Initial Type III collagen can be replaced with Type I collagen. Post-injury tissue will not match the pre-injury tissue strength.
  • Type III is made up of weak fibrils with random orientation
  • Type I has greater tensile strength and has more cross linkages.

Treatment

• Active Rehabilitation aimed at increasing
  • Strength
  • Endurance
  • Flexibility
  • Posture and Body Mechanics
  • Manual Manipulation
  • Deep tissue myofascial release
  • Orient scar tissue along lines of stress for maximum functionality.
HOME REHABILITATION!

- Experiences with patient compliance?

TECHNICAL OFFICE REHABILITATION

- Cervicothoracic
- Lumbar / Core

LOW TECH OFFICE REHABILITATION

Must document what rehab the patient is doing…
LEARNING ACTIVITY

Patient is 6 months status post MVC with chronic cervicothoracic pain and headaches. The patient has undergone 4 months of prior chiropractic care.

Prior treatment: Passive modalities, spinal manipulation and myofascial release. He has also undergone 2 months of acupuncture.

• Devise a relevant treatment plan for this individual or relevant recommendations.