

Physiological Healing Processes

Soft Tissue Injuries

- Etiology (causes)
 1. Direct – contusions, lacerations, fractures, etc.
 2. Indirect – acute, chronic, acute on chronic
- Severity-
 - Grade 1 – mild pain at time or w/in 24 hrs. esp. when stressed; local tenderness not necessarily present
 - Grade 2 – pain occurs at time and person has to stop activity; moderate to severe pain and local tenderness when stressed
 - Grade 3 – complete or near complete rupture or avulsion of portion ligament or tendon w/ severe pain and/or loss of function; possibly palpable defect

Inflammatory Response

- 1) Discoloration
- 2) Pain
- 3) Local heat
- 4) Swelling (edema)

General Tissue Response

- Rise in temperature of the tissues
- Capillaries are ruptured
- Increase in passage of fluid to injury site
- Swelling causes pain
- Loss of active ROM due to tissue injury, pain, swelling and possible muscle spasms

Phases of Soft Tissue Healing

1. Phase 1: 24-72 hours – acute inflammatory – “reactive phase”
2. Phase 2: 72 hrs.- 6 weeks – repair; regeneration
3. Phase 3: Remodelling

Strains - sprains – stress fractures

- Tests for muscle vs. ligament injury
- Strain – injury to muscle and/or tendon. Often eccentrically contracting muscle.
- In muscle belly 40%; In muscle-tendon junction 40%
- Grade 1: 10% partial tear – heals 3-5 days
- Grade 2: 10-50% - heals 2-3 weeks
- Grade 3: 50-100% - healing time – refer to MD
- Treatment - 1st phase: PRICE, ROM - Ice 20-30 every hour first 24 hour period w/ gentle ROM exercises; 2nd 3rd days – exercises & ice 3x/day for 20 min. on day 2-3 followed by ROM. Do not do with pain!

Strains – cont'd

- 2nd phase: careful pain-free ROM
- 3rd phase: progressive resistance exercises – aim, ultimately, for full pain free ROM, strength, power, speed and extensibility
- 4th phase: integrate exercises for strain tissues along with other adjacent muscles.
- 5th – rehab for return to full use

Sprain – to ligament

- Trauma to a joint
- Pain greater in passive than active movement
- Treatment –
- 1st phase: PRICE 24-72
- 2nd phase: continue to protect; begin guided motion preventing excessive or miswoven scar tissue
- 3rd: 7-21 days – encourage normal ROM, begin massage, applications of moist heat prior to movement to increase flexibility; ice following movement to reduce edema. Goals – complete ROM with NO undue joint instability.
- 4th: Re-education/fine-tuning of injured joint and surrounding structures; joint not swollen or sensitive to motion.

Stress Fractures

- Slight cracks in bone surface
- Signs: point of tenderness of bone, soft tissue swelling, palpation of callous, alteration gait, muscle atrophy; pain

Other common injuries or predispositions

- muscle tension
- ischemia
- inflexibility
- soreness
- trigger point
- edema
- tendonitis
- tenosynovitis
- tendinosis

Tissue Healing & Massage Therapy

- Mechanisms of soft tissue injury: compression, tension, shear
- Phases:
- Inflammation:
 1. short-lived Vasoconstriction – damaged tissue forms hematoma
 2. Vasodilation – edema + hypoxic damage may create secondary injury (sometimes greater than initial injury!)

Tissue Healing & Massage Therapy - cont'd 1

- Regeneration - in 3 ways: resolution, regeneration, scar tissue. (Striated muscle limited in regeneration so prone to scarring.)

“macrophages like garbage trucks in lead, clearing away debris, followed by new blood vessels/supply lines; followed by fibroblasts building new tissue. Significant amounts of collagen produced beginning on 4th or 5th day and continuing for 2-4 weeks.”

Tissue Healing & Massage Therapy - cont'd 2

- Remodeling
- Scar at first randomly organized - with insufficient movement, tissue heals but is poorly adapted
- Movement and massage will contribute to a “good scar” - an organized weave that can facilitate broadening and lengthening
- Reiterated important of PRICE - esp. cold's preventing secondary hypoxic injury

Tissue Healing & Massage Therapy - cont'd 3

- Massage - reduces edema and, when appropriate, enhances circulation (during remodeling phase)
- Inability of soft tissue to resist shear (perpendiculary directed) forces - gives cross-fiber (“deep transverse friction) an advantage in facilitating organized “re-weave”