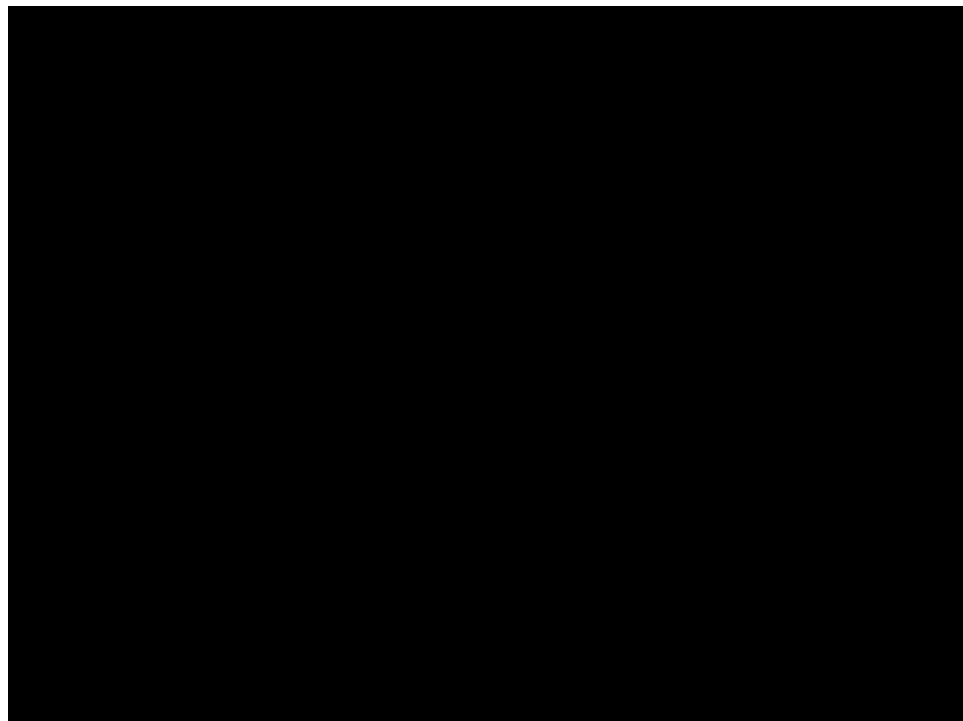




Soft tissue injury , Repair & Management

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CHAPTER No 10

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✓ Examination
✓Involved Tissue
✓Stage of Healing

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designing therapeutic
exercise programs
and choosing techniques for
intervention that are at an
appropriate intensity for
the stage of healing of
connective tissue
disorders.

4

Clinical Conditions Resulting from Trauma or Pathology

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Dysfunction

- Loss of normal function of a tissue or region.
- The dysfunction may be caused by **adaptive shortening of the soft tissues**, adhesions, **muscle weakness**, or any condition resulting in loss of normal mobility

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Joint dysfunction

–: Mechanical loss of normal joint play in synovial joints; commonly causes loss of function and pain.

Precipitating factors may be trauma, immobilization, disuse, aging, or a serious pathological condition



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Contracture

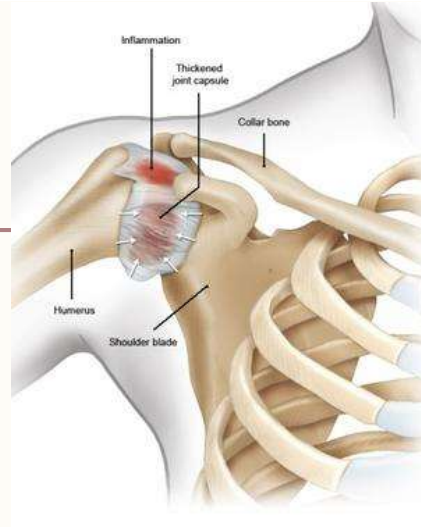
Adaptive shortening of skin, fascia, muscle, or a joint capsule that prevents normal mobility or flexibility of that structure



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Adhesion

- : Abnormal adherence of collagen fibers to surrounding structures during immobilization, after trauma, or as a complication of surgery, which restricts normal elasticity and gliding of the structures involved.



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Myofascial compartment syndromes

- : Increased interstitial pressure in a closed, nonexpanding, myofascial compartment that compromises the function of the blood vessels, muscles, and nerves. **It results in ischemia and irreversible muscle loss if there is no intervention.**
- Causes include, but are not limited to, fractures, repetitive trauma, crush injuries, skeletal traction, and restrictive clothing, wraps, or casts.



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Tissue injury Severity

- First degree (G 1): Mild pain at the time of injury or within the first 24 hours. Mild swelling, local tenderness, and pain occur when the tissue is stressed.
- 2nd (G 2): Stopping of activity d/t moderate pain. Stress and palpation of tissue greatly increases pain . When the injury is to ligaments, some of the fibers are torn, resulting in some increased joint mobility
- 3rd (G 3): Near complete or complete tear or avulsion of tissue with severe pain. Stress to tissue is painless. Palpation may reveal defect. Ligament tear leading to instability.

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Irritability of Tissue: Stages of Inflammation and Repair

- After any insult to connective tissue, whether it is from mechanical injury (including surgery) or chemical irritant, the vascular and cellular response is similar .
- Tissue irritability, or sensitivity, is the result of these responses and is typically divided into three overlapping stages of inflammation, repair, and maturation/remodeling

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Stages of tissue healing

– Acute Stage (Inflammatory Reaction)

- ✓ Signs of inflammation

- ✓ Painful movement ,guarding before end ROM
- ✓ The pain and impaired movement are from the altered chemical state that irritates the nerve endings , increased tissue tension due to edema or joint effusion, and muscle guarding, which is the body's way of immobilizing a painful area.
- ✓ 4-6 days

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Subacute Stage (Proliferation, Repair, and Healing)

During the subacute stage, the signs of inflammation progressively decrease and eventually are absent. When testing ROM, the patient may experience pain synchronous with encountering tissue resistance at the end of the available ROM. Pain occurs only when the newly developing tissue is stressed beyond its tolerance or when tight tissue is stressed. Muscles may test weak, and function is limited as a result of the weakened tissue.

This stage usually lasts 10 to 17 days (14 to 21 days after the onset of injury) but may last up to 6 weeks in some tissues with limited circulation, such as tendons

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Chronic Stage (Maturation and Remodeling)

- There are no signs of inflammation during the chronic stage. There may be contractures or adhesions that limit range, and there may be muscle weakness limiting normal function.
- During this stage, connective tissue continues to strengthen and remodel in response to the stresses applied to it. A stretch pain may be felt when testing tight structures at the end of their available range.
- Function may be limited by muscle weakness, poor endurance, or poor neuromuscular control. This stage may last 6 months to 1 year depending on the tissue involved and amount of tissue damage.

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BOX 10.3 Signs of Excessive Stress with Exercise or Activities

- Exercise or activity soreness that does not decrease after 4 hours and is not resolved after 24 hours
- Exercise or activity pain that comes on earlier or is increased over the previous session
- Progressively increased feelings of stiffness and decreased ROM over several exercise sessions
- Swelling, redness, and warmth in the healing tissue
- Progressive weakness over several exercise sessions
- Decreased functional usage of the involved part

Exercise progressions may cause some temporary soreness that can last 4 hours, but if the above signs and symptoms occur, the activity, exercise, or stretching maneuvers are too stressful and should be modified or reduced in intensity.

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Management



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Management guidelines

- ✓ control the effects of inflammation
- ✓ Facilitate wound healing
- ✓ Maintain proper functioning of sound / healthy areas.

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Patient Education

- Expected time frame
- Does and don'ts
- Precautions , contraindications
- Reassurance : acute symptoms are of short duration

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Protection of injured tissue

- To minimize pain and promote healing 24-48 hours to
- ❖ RICE
 - Rest (Splint , tape , cast)
 - Ice
 - Compression
 - Elevation
- Protection of L/Es with partial or non Wt bearing.

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Prevention of adverse effects of immobilization

- Complete immobilization during acute stage of tissue injury is helpful Or not ??
- Adherence of developing fibrils to surrounding tissue etc.
- Tissue specific movement to prevent adhesions.
- Intensity of movement is gentle thus preventing detachment of fibrils

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- Active movement is usually *contraindicated* at the site of an active pathological process unless it is a chronic disease, such as rheumatoid arthritis.
 - Stretching ??
 - Low dosage Mobs for fluid dynamics ,cartilage health

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Muscle setting

- Ms setting with low Int so that no pain and Jt compression
- If there is muscle damage or injury, the setting techniques are done with the muscle in the shortened position to help maintain mobility of the actin-myosin filaments without stressing the breached tissue.
- In case of Jt injury what should be the joint position while performing Ms setting
????

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Associated areas

- ROM
- Resisted Ex
- Functional activity

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- It is important to prevent vascular stasis, which may occur due to swelling and immobility. Circulation is helped by encouraging functional activities within safe parameters and by using supportive elastic wraps, elevating the part, and using appropriate massage and muscle-setting techniques.

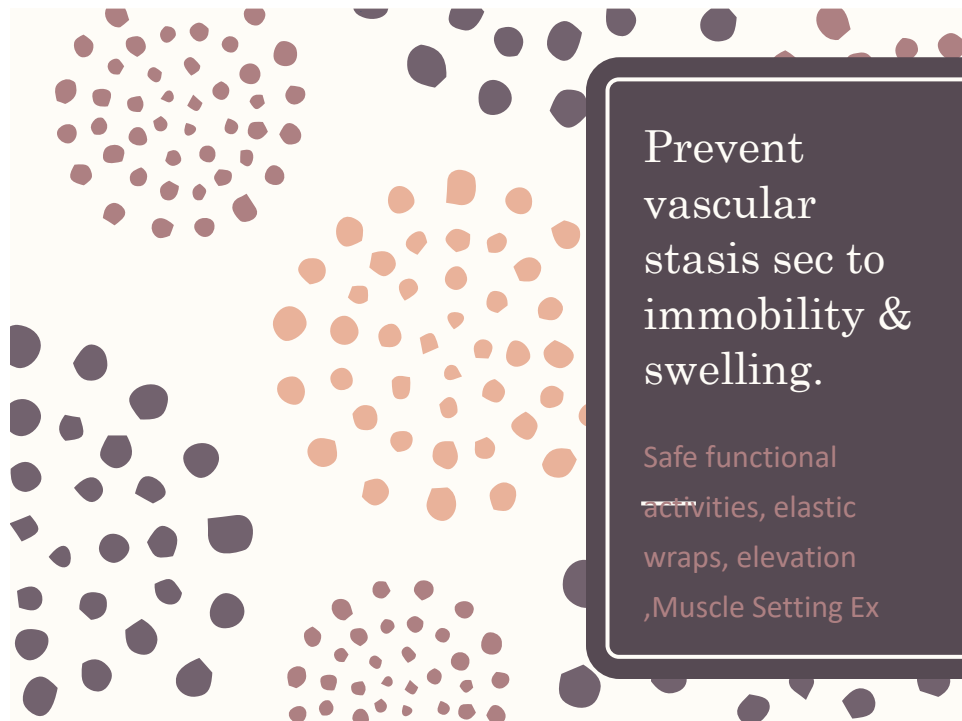
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Offered a new pen to write with, 97% of all people will write their own name.

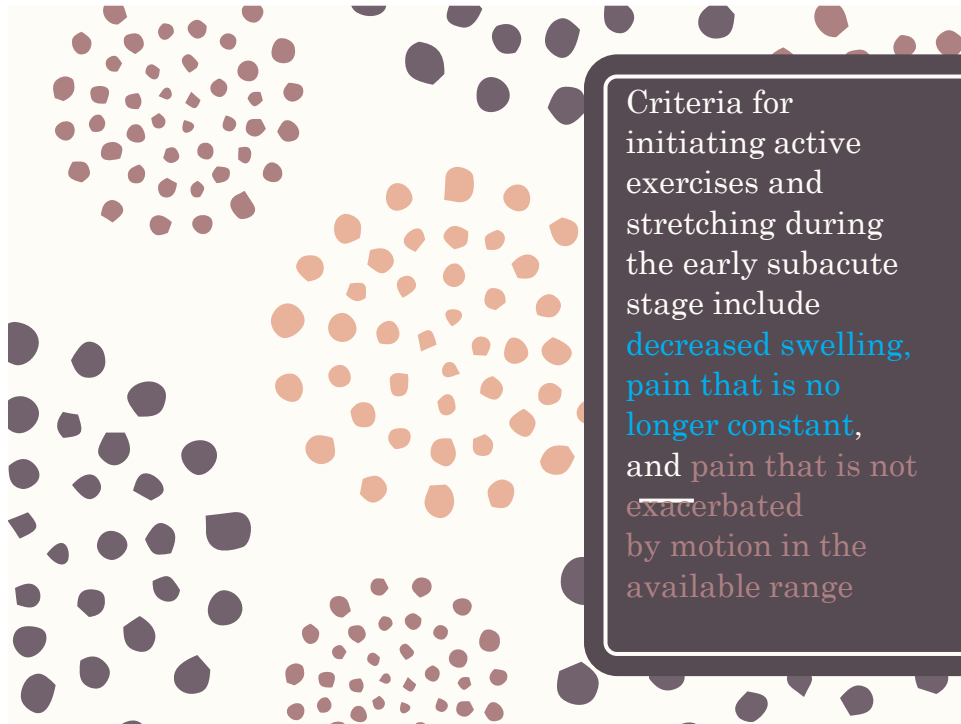
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BOX 10.1 MANAGEMENT GUIDELINES— Acute Stage/Protection Phase	
Structural and Functional Impairments: Inflammation, pain, edema, muscle spasm Impaired movement Joint effusion (if the joint is injured or if there is arthritis) Decreased use of associated areas	
Plan of Care	Intervention (up to 1 week postinjury)
1. Educate the patient.	1. Inform patient of anticipated recovery time and how to protect the part while maintaining appropriate functional activities.
2. Control pain, edema, spasm.	2. Cold, compression, elevation, massage (48 hours). Immobilize the part (rest, splint, tape, cast). Avoid positions of stress to the part. Gentle (grade I or II) joint oscillations with joint in pain-free position.
3. Maintain soft tissue and joint integrity and mobility.	3. Appropriate dosage of passive movements within limit of pain, specific to structure involved. Appropriate dosage of intermittent muscle setting or electrical stimulation.
4. Reduce joint swelling if symptoms are present.	4. May require medical intervention if swelling is rapid (blood). Provide protection (splint, cast).
5. Maintain integrity and function of associated areas.	5. Active-assistive, free, resistive, and/or modified aerobic exercises, depending on proximity to associated areas and effect on the primary lesion. Adaptive or assistive devices as needed to protect the part during functional activities.
PRECAUTIONS: The proper dosage of rest and movement must be used during the inflammatory stage. Signs of too much movement are increased pain or increased inflammation.	
CONTRAINDICATIONS: Stretching and resistance exercises should not be performed at the site of the inflamed or swollen tissue.	

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Criteria for initiating active exercises and stretching during the early subacute stage include decreased swelling, pain that is no longer constant, and pain that is not exacerbated by motion in the available range

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BOX 10.2 MANAGEMENT GUIDELINES— Subacute Stage/Controlled Motion Phase	
Structural and Functional Impairments:	
Pain when end of available ROM is reached	
Edema (decreasing but may still be present)	
Joint effusion (decreasing but may still be present if joints are involved)	
Soft tissue, muscle, and/or joint contractures (developing in immobilized region)	
Muscle weakness from reduced usage or pain	
Decreased functional use of the part and associated areas	
Plan of Care	Intervention (up to 3 weeks postinjury)
1. Educate the patient.	1. Inform patient of anticipated healing time and importance of following guidelines. Teach home exercises and encourage functional activities consistent with plan; monitor and modify as patient progresses.
2. Promote healing of injured tissues.	2. Monitor response of tissue to exercise progression; decrease intensity if pain or inflammation increases. Protect healing tissue with assistive devices, splints, tape, or wrap; progressively increase amount of time the joint is free to move each day and decrease use of assistive device as strength in supporting muscles increases.
3. Restore soft tissue, muscle, and/or joint mobility.	3. Progress from passive to active-assistive to active ROM within limits of pain. Gradually increase mobility of scar, specific to structure involved. Progressively increase mobility of related structures if limiting ROM; use techniques specific to tight structure.

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4. Develop neuromuscular control, muscle endurance, and strength in involved and related muscles.

4. Initially, progress multiple-angle isometric exercises within patient's tolerance; begin cautiously with mild resistance. Initiate AROM, protected weight bearing, and stabilization exercises. As ROM, joint play, and healing improve, progress isotonic exercises with increased repetitions. Emphasize control of exercise pattern and proper mechanics. Progress resistance later in this stage.

5. Maintain integrity and function of associated areas.

5. Apply progressive strengthening and stabilizing exercises, monitoring effect on the primary lesion. Resume low-intensity functional activities involving the healing tissue that do not exacerbate the symptoms.

PRECAUTIONS: The signs of inflammation or joint swelling normally decrease early in this stage. Some discomfort will occur as the activity level is progressed, but it should not last longer than a couple of hours. Signs of too much motion or activity are resting pain, fatigue, increased weakness, and spasm lasting beyond 24 hours.

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“Proximal stability before distal mobility”

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**BOX 10.4 MANAGEMENT GUIDELINES—
Chronic Stage/Return to Function Phase**

Structural and Functional Impairments:

Soft tissue and/or joint contractures and adhesions that limit normal ROM or joint play
Decreased muscle performance—weakness, poor endurance, poor neuromuscular control
Decreased functional usage of the involved part
Inability to function normally in an expected activity

Plan of Care

Interventions (>3 weeks post-injury)

1. Educate the patient.	1. Instruct patient in safe progressions of exercises and stretching. Monitor understanding and compliance. Teach ways to avoid reinjuring the part. Teach safe body mechanics. Provide ergonomic counseling.
2. Increase soft tissue, muscle and/or joint mobility.	2. Stretching techniques specific to tight tissue: <ul style="list-style-type: none"> ■ Joint and selected ligaments (joint mobilization/manipulation) ■ Ligaments, tendons, and soft tissue adhesions (cross-fiber massage) ■ Muscles (neuromuscular inhibition, passive stretch, massage, and flexibility exercises)
3. Improve neuromuscular control, strength, muscle endurance.	3. Progress exercises: <ul style="list-style-type: none"> ■ Submaximal to maximal resistance ■ Specificity of exercise using resisted concentric and eccentric, weight bearing and nonweight-bearing ■ Single plane to multiplanar motions ■ Simple to complex motions, emphasizing movements that simulate functional activities ■ Controlled proximal stability, superimpose distal motion ■ Safe biomechanics ■ Low repetitions to high repetitions at slow speeds; progress complexity and time; progress speed and time.

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4. Improve cardiopulmonary endurance.

4. Progress aerobic exercises using safe activities.

5. Progress functional activities.

5. Continue using supportive and/or assistive devices until the ROM is functional with joint play, and strength in supporting muscles is adequate. Progress functional training with simulated activities from protected and controlled to unprotected and variable. Continue progressive strengthening exercises and advanced training activities until the muscles are strong enough and able to respond to the required functional demands.

PRECAUTIONS: There should be no signs of inflammation. Some discomfort will occur as the activity level is progressed, but it should not last longer than a couple of hours. Signs that activities are progressing too quickly or with too great a dosage are joint swelling, pain that lasts longer than 4 hours or that requires medication for relief, a decrease in strength, or fatiguing more easily.

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