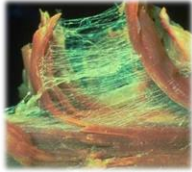


Current Evidence & Concepts on Myofascial Treatment



Thank You AZATA!!



Course Faculty

- Scott Cheatham PT, DPT, PhD(c), OCS, ATC, CSCS
 - Assistant Professor, Division of Kinesiology
 - California State University Dominguez Hills, Carson CA.

Course Objectives

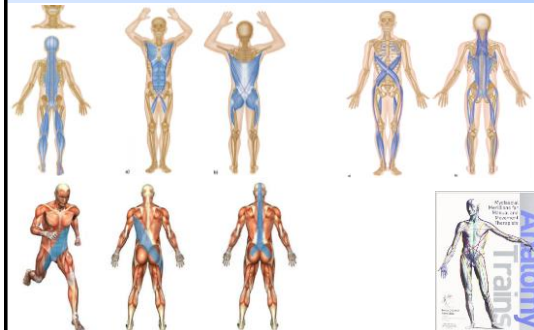
- At the conclusion, participants will be able to:
 - Describe the components of the myofascial complex.
 - Discuss common treatment techniques.
 - Appraise the research evidence on the effectiveness of common MF treatment techniques.
 - Discuss common corrective strategies to enhance myofascial mobility.
 - Critique case study(s) related to myofascial dysfunction.

Defining the Myofascial System

- **Definition:**
 - Fascia is connective tissue fibers, primarily collagen, that form sheets or bands beneath the skin to attach, stabilize, enclose, and separate muscles and other internal organs.
 - Fasciae are classified according to their distinct layers, their functions and their anatomical location.



Myofascial Meridians (Slings)



Basic Science

Components of the Myofascial System

Fascia and Movement

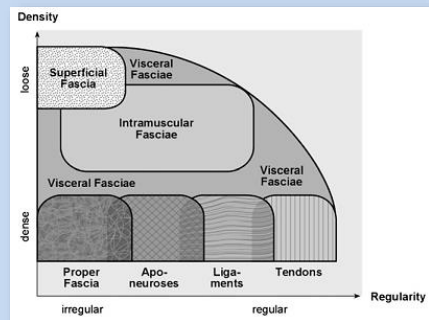
- A. Force transmission
- B. Pre tension
- C. Rich in contractile cells, proprioceptors and nociceptors
- D. Interconnected tensional network for stability and communication
- E. Adapts its fiber arrangement, length, and density according to local demand
- F. Promotes sliding and reduces compartment friction during motion

Classification

- Superficial fascia- comprised of the subcutaneous loose connective tissue containing a web of collagen, as well as some fibers of mostly elastin
- Deep fascia-formed by a connective membrane that sheaths all muscles. Devoid of fat and forms sheaths for the nerves and vessels, envelops various organs and glands.
- Epimysium-comprises the fascia that encloses each single muscle and is continuous with perimysium and endomysium. It is directly involved in the play of tension between the muscle spindles and the Golgi tendon organs



Langevin, H., Huijing, P., 2009. Communicating about fascia: history, pitfalls, and recommendations. *International Journal of Therapeutic Massage and Bodywork* 2 (4), 3 e 8.



Training principles for fascial connective tissues: Scientific foundation and suggested practical applications Schleip & Muller *J. of Bodywork and Movement Therapies* (2012)

Up to half of the total force generated by the muscle is transmitted to surrounding connective tissues & neighboring muscles
J. of Biomechanics 1999 Huijing



From “Muscle Attitudes” by Jean-Claude Guimberteau M.D.



From "Skin, Scars and Stiffness" by Jean-Claude Guimberteau M.D.

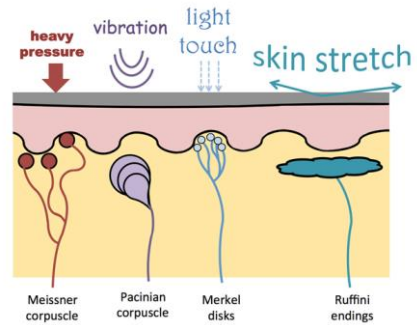


Table 2
Stress Ranges for Plastic Deformation of In Vitro Fasciae,
With Compression and Shear Ratios

Fascia Type	Stress Range, N/cm ²	Compression and Shear Ratio Under Stress
Fascia lata*	1275.00-1949.00	Negligibly small
Plantar fascia*	869.65-1454.00	Negligibly small
General Fascia†	788.00-1997.00	Data not provided

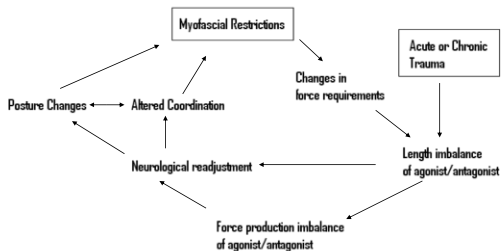
* Predicted stress range based on the authors' original calculations.
† Experimental stress range based on analysis by Threlkeld¹ using Xsensor pressure mapping system (X3 Lite Seat System, Version 4.2.3; XSENSOR Technology Corp, Calgary, Canada).

Three-Dimensional Mathematical Model for Deformation of Human Fasciae in Manual Therapy
Chaudhry et al. J. of American Osteopathic Association August 2008

*1275-1949 Newton per square centimeter=1849-2827
Pounds per square inch

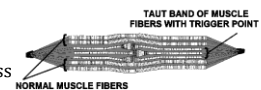
Myofascial Restriction (Martin 2011)

Restriction in normal muscle function due to injury
or biomechanical force imbalance

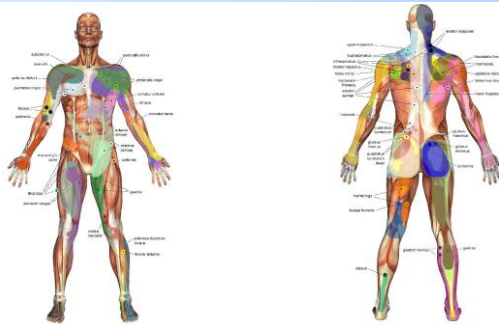


Trigger Points (Martin 2011)

- Discrete, focal, hyperirritable spot in taut band of muscle
- Occurring in all patients with musculoskeletal pain
- Can be active or latent
- Symptoms:
 - Painful on compression
 - Referred pain/tenderness
 - Motor dysfunction
- No evidence for development mechanism of Trigger Points
Acute and chronic trauma, chronic lengthening, sleep disturbance, anxiety

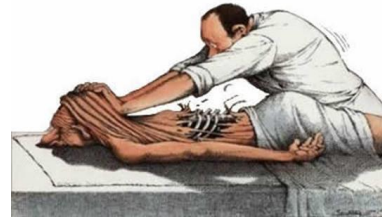


Common Trigger Point Sites

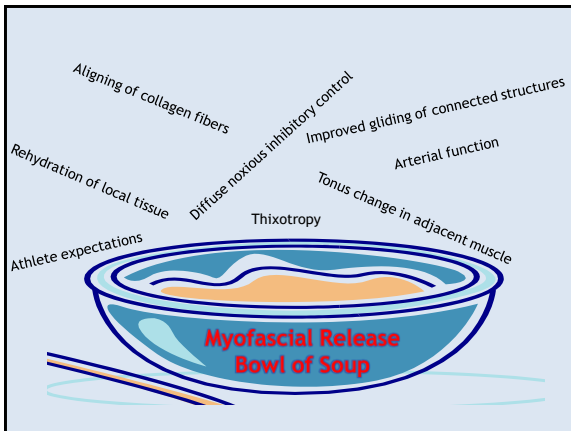


<http://postherback.com/wp-content/uploads/2012/10/Trigger-Point-Back.jpg>

What Occurs During Myofascial Release?



Drawing by [Claude Serre](#)



Reported Benefits



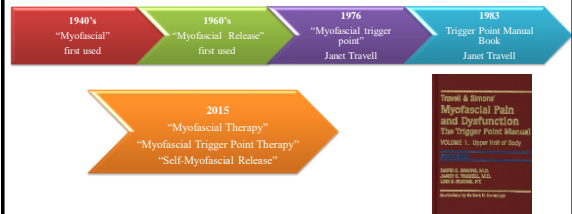
Myofascial Treatment

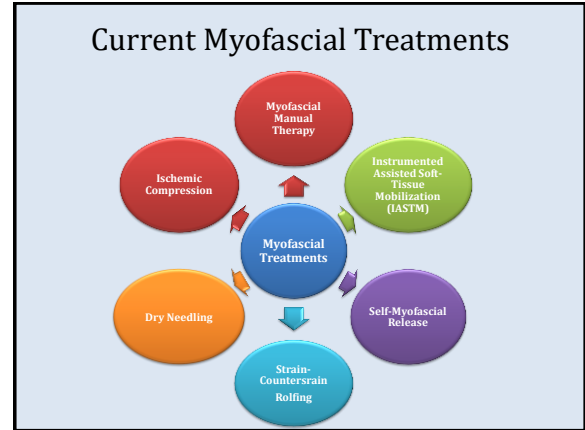
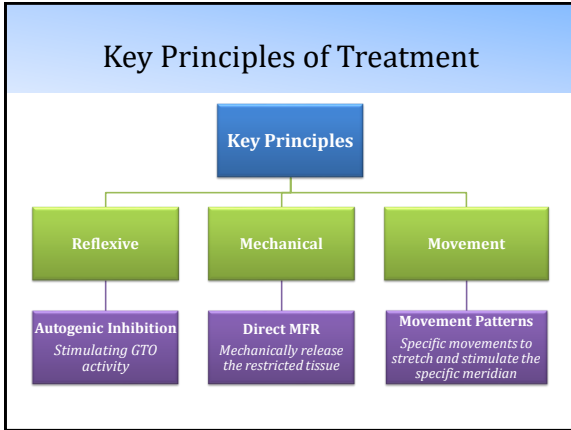


<http://www.colorsbodyandmind.com>

Myofascial Release

- **Definition:** Myofascial release (MFR) is a collection of approaches and techniques that focuses on freeing restrictions of movement that originate in the soft tissues of the body.
- **History:**





What does the evidence say?

Asking is the Answer

CEBM Levels of Evidence

Level of Evidence	Grading Criteria
Level 1	A: Systematic Review of RCT's
	B: Individual RCT with narrow CI
	C: Series of cases (all or none)
Level 2	A: Systematic review of cohort studies
	B: Individual cohort study, RCT with drop outs >20%
	C: "Outcomes" Research or ecologic studies
Level 3	A: Systematic Review of case-control studies
	B: Individual case-control
Level 4	Case Series
Level 5	Expert's opinion

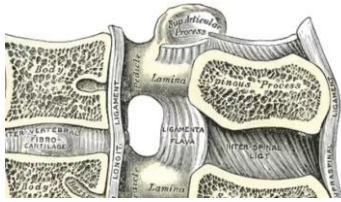
OCEBM Levels of Evidence Working Group. "The Oxford Levels of Evidence". Oxford Centre for Evidence-Based Medicine. <http://www.cebm.net/index.aspx?o=5653>

Myofascial Manual Therapy

- ### Myofascial Manual Therapy
- **Direct MFR:** tissue is loaded with a constant force until "release" occurs in the desired direction.
 - **Indirect MFR:** tissue is lightly stretched and the therapist applies slow, steady pressure in the direction that the fascia can be felt to allow greatest ease of movement "unwinding".
 - **Trigger Point:** ischemic compression to a trigger point (latent or active).

Myofascial Manual Therapies

- Other Myofascial Therapies
 - Dry needling



Does myofascial manual therapy provide benefits?

Myofascial Manual Therapy

- 2015: Ajimsha et al. *J Bodyw Mov Ther* (Level 1a)
- 2015: Yuan et al. *Man Ther* (Level 1a)
- 2013: McKenney et al. *J Athl Training* (Level 1a)

Interventions	Parameters
Treatment technique	Variable, often combined with other interventions
Treatment duration	Variable among studies
Outcome measures	Variable: Pain (0-10), Questionnaires
Long-term outcomes	Poorly reported

Target Population: (+) results with orthopedic conditions, fibromyalgia, post breast cancer, TMD

Bottom Line: MF therapy shows positive outcomes. However, the research is varied with the type of technique, combined interventions, and poorly reported long-term outcomes.

Myofascial Trigger Point Therapy Ischemic Compression

- 2015: Cagnie et al. *Arch Phys Med Rehabil* (Level 1a)
- 2015: Takamoto et al. *Eur J Pain* (Level 1b)
- 2015: Hains et al. *J Can Chiropr Assoc* (Level 1b)
- 2013: Cagnie et al. *J Manipulative Physio Therp* (Level 1b)

Interventions	Parameters
Treatment technique	Ischemic compression (TP site)
Treatment duration	15-60 seconds of compression (i.e. 6 reps)
Outcome measures	Pain (0-10), ROM, strength, pain threshold, questionnaires
Long-Term Outcomes	6 months

Target Population: (+) results with individuals with MF pain and TrP's

Bottom Line: Ischemic compression has shown moderate evidence for favorable outcomes for treating MF trigger points. However, the research is varied with the protocol for treatment and poorly reported long-term outcomes.

Myofascial Trigger Point Therapy Dry needling

- 2015: Liu et al. *Arch Phys Med Rehabil* (Level 1a)
- 2015: Ong and Claydon. *J Bodyw Mov Ther* (Level 1a)
- 2014: Dunning et al. *Phys Ther Rev* (Level 1a)
- 2013: Kietry's et al. *J Orthop Sports Phys Ther* (Level 1a)

Interventions	Parameters
Treatment technique	Dry needling (variable techniques)
Treatment duration	10-30 minutes
Outcome measures	Variable: Pain (0-10), Questionnaires
Long-Term Outcomes	Short: 3 days, Long: 1-6 months

Target Population: (+) results with individuals with MF pain

Bottom Line: Dry needling is show favorable outcomes for treating MF trigger points but is often grouped with other interventions (ischemic compression) However, the research is varied with the type of technique and poorly reported long-term outcomes.

Self-Myofascial Release



Self-Myofascial Release

- **Definition:** This approach uses a device, such as a foam roll or roller massager, to apply external pressure to a region of the body using the person's own bodyweight.
 - SMFR is typically used to treat somatic dysfunction and resulting pain and restriction of motion.



Tools of the Trade



<http://www.rumbleroller.com/>

Does self-myofascial release improve range of motion?

Foam Roller or Roller Massager

Foam Roll: Acute Effects on ROM

- 2015: Peacock et al. J Strength and Cond Res (Level 1a)
- 2015: Bushell et al. J Strength and Cond Res (Level 1a)
- 2014: Mohr et al. J Sports Rehab (Level 1a)
- 2013: MacDonald et al. J Strength Cond Res (Level 2b)

Interventions	Parameters
Treatment technique	Foam Roll
Treatment duration	1-20 minutes (2-6 sessions)
Outcome measures	ROM (measured 0-10 min post), Questionnaires
Long-Term Outcomes	Acute outcomes studied

Target Motions: (+) Knee flexion ROM, Hip flexion ROM, and Hip Extension ROM, Sit and reach test

Bottom Line: Foam rolling seems to have a favorable outcomes for improving acute lower extremity joint ROM. However, the research is varied with the intervention protocol (frequency and duration).

Roller Massage: Acute Effects on ROM

- 2015: Bradbury et al. J Athl Train (Level 1a)
- 2014: Helperin et al. Int J Sports Phys Ther (Level 1a)
- 2014: Grieve et al. J of Bodyworks Movement Ther (Level 1a)
- 2013: Sullivan et al. Int J Sports Phys Ther (Level 4)

Interventions	Parameters
Treatment technique	Roller massager
Treatment duration	5 seconds to 2 minutes (2-4 sessions)
Outcome measures	ROM (measured 0-10 min post), Questionnaires
Long-Term Outcomes	Acute outcomes studied

Target Motions: Knee flexion ROM, Ankle Dorsiflexion ROM, Sit and reach test

Bottom Line: Roller massager seems to have a favorable outcomes for improving acute lower extremity joint ROM. However, the research is varied with the intervention protocol (frequency and duration).

Does self-myofascial release influence recovery of DOMS?

Foam Roller or Roller Massager

SMFR: Effects on Recovery and DOMS

- 2014: Jay et al. Int J of Sports Phys Ther (Level 1a)
- 2014: Pearcy et al. J of Athl Train (Level 1a)
- 2014: MacDonald et al. J Strength Cond Res (Level 2b)

Interventions	Parameters
Treatment technique	Foam Roll
Treatment duration	10-20 minutes
Outcome measures	VAS, ROM, Pressure pain threshold, ROM, Muscle performance
Long-Term Outcomes	Acute outcomes studied

Target Parameters: Recovery parameters after DOMS protocol

Bottom Line: Foam rolling seems to have a favorable outcomes for improving post intense exercise recovery and DOMS. However, the research is varied with the intervention protocols (frequency and duration).

Comments

- **Precaution:** subjects reported moderate pain. Help them choose the right tools.

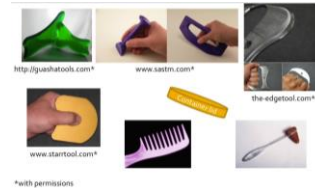


Instrumented Assisted Soft-Tissue Mobilization



Instrumented Assisted Soft-Tissue Mobilization (IASTM)

- **Definition:** various shaped tools are used to augment the mobilization of soft-tissue mobilization.
- Several patented tools and approaches exists

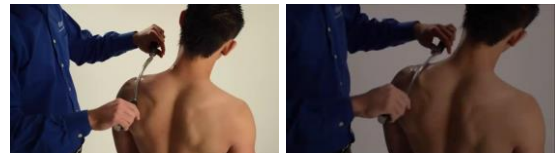


Tools of the Trade

- Graston® Technique
- Gua Sha Tools
- Hawk Grip®



IASTM Technique (Videos)



Courtesy: Myofascial Releaser @ <http://www.myofascialreleaser.com>

Does IASMT provide benefits?

IASTM Research

- 2014: Laudner K et al. *Int J of Sports Phys Ther* (Level 2b)
- 2014: Lee JJ et al. *Biomed Mater Eng* (Level 2 b)
- 2014: Strnk et al. *J Chiropr Med* (Level 4)
- 2013: Baker R et al. *Int J of Athl Ther and Train* (Level 4)
- 2012: Papa JA. *J Can Chiropr Assoc* (Level 4)
- 2011: Miners AL, Bougie TL. *J Can Chiropr Assoc* (Level 4)

Interventions	Parameters
Treatment technique	IASTM
Treatment duration	Variable (40 seconds to 2minutes)
Outcome measures	VAS, ROM, pain threshold, strength, EMG activity
Long-Term Outcomes	Poorly reported

Target Population: Shoulder ROM, lateral epicondylitis, achilles tendonitis, plantar fasciitis, knee arthrofibrosis, muscle inhibition in stroke patients

Bottom Line: The research on IASTM is emerging but is limited to only a couple of controlled studies and case reports. No systematic reviews have been done.

Enhancing Myofascial Mobility

Acute Variables for Strategic Movement

1. Less than the tissue's barrier
2. Slow
3. Controlled
4. Rhythmical
5. Oscillating

Benefits of Strategic Movement for Myofascial Extensibility

Heat and fluid exchange to the tissue

Breaking down of cross bridges creating more parallel arrangement of collagen fibers

Down regulate activity of joint and soft tissue mechanoreceptors

Positive Autonomic response

Case Study #1

Shoulder Impingement Secondary to Postural Dysfunction

Case History

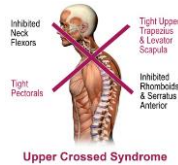
- **Patient:** Female (28 year-old)
 - Wt:125 lbs, Ht. 63 inches (Endomorphic build)
 - Occupation: Corporate Attorney
 - Physical Activity: Occasional gym activity, jogging
- **Mechanism:** Insidious onset of right shoulder pain 4 weeks ago.
 - Shoulder and upper back began to hurt after prolonged hours of computer work
- **Current Symptoms:**
 - Intermittent “sharp” pain with reaching overhead, hand behind back, and lifting heavy objects.
 - Neck and upper back fatigue after 1 hour of computer work
- **Diagnosis:** Right Shoulder Impingement secondary to postural dysfunction
 - MRI (-), Radiograph (+) subacromial bone spur

Initial Examination

- **Initial Examination:** 1 week after referral
 - Pt cleared by physician for physical therapy and return to gym activity . Right arm restricted to pain-free activity
- **Functional Status:**
 - Pt still working full-time with limited computer work to 30 minutes
- **Aggravating Factors:**
 - Overhead reaching, hand behind back lifting heavy objects
- **Relieving Factors:** Rest and meds
- **Pain:**
 - Worst: 6/10 pain with aggravating factors
 - Average: 3/10 with activities of daily living
 - Best: 2/10 pain with medication
- **Medication:** NSAID (PRN)
- **Systems Review:** Insignificant for medical “red flags”

Test & Measures

- **Observations/Screen**
 - Neurovascular (WNL)
 - Inspection (WNL)
- **Posture**
 - Standing: Kyphotic-Lordotic (Upper Cross)
 - Seated: Forward head, rounded shoulders
- **Cervical ROM**
 - Rot: R:60° L:65°
 - Flex: Chin to chest
 - Extension: hinging at C5-C7
- **Thoracic Movement**
 - Poor upper thoracic extension



Test & Measures

Muscle Performance

Motion Tested	Right	Left
Flexion/Scaption	3/5	4+/5
Abduction	NT	4+/5
Internal Rotation	3/5	4+/5
External Rotation	3/5	4/5
Scapular Adduction	3+/5	3+/5
Scapular Protraction	3+/5	3+/5

Shoulder ROM

Motion Tested	Right	Left
Shoulder Flexion	90°	165°
Shoulder Abduction	80°	165°
Shoulder Internal Rotation (ABD)	55°	70°
Shoulder External Rotation (ABD)	70°	85°
Hand Behind Back	NT	T6
Hand Behind Head	NT	Occiput

Test & Measures

- | | |
|--|---|
| <p>Muscle Length/Palpation</p> <ul style="list-style-type: none"> • Latissimus Dorsi Length (+) • Pectoralis Length (+) • Right UE <ul style="list-style-type: none"> – Posterior Shoulder (+) • Palpation <ul style="list-style-type: none"> – 4/5 over anterior lateral shoulder – 3/5 posterior shoulder • MF restriction <ul style="list-style-type: none"> – Posterior shoulder, upper trapezius, levator scapulae interstion – TrP’s Levator and Trapezius | <p>Joint Mobility/Special Testing</p> <ul style="list-style-type: none"> • Joint Mobility: <ul style="list-style-type: none"> – Spine: T1-78 Hypomobile – Shoulder: A-P Moderate Hypomobility with muscular end-feel • Special Testing: <ul style="list-style-type: none"> – Painful Arc (+) – Hawkins-Kennedy (+) – Neer (+) |
|--|---|

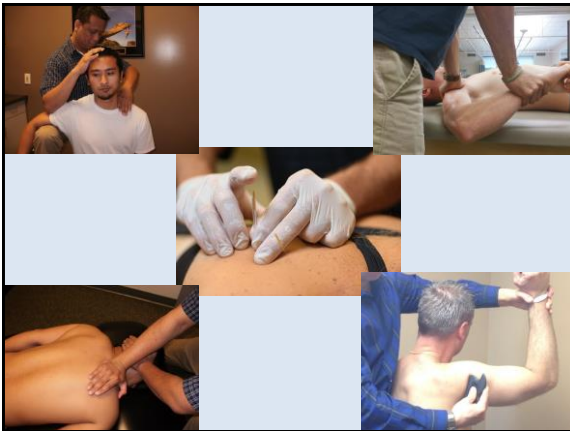
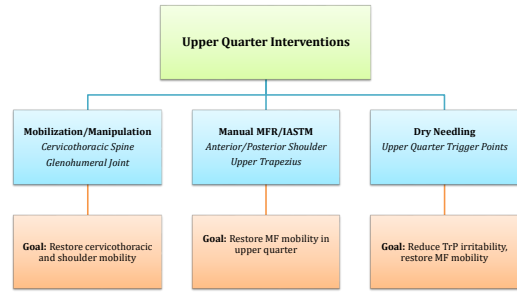
Assessment

- **Posture & ROM:**
 - Kyphotic-Lordotic Posture with increase forward head and rounded shoulder with sitting.
 - Right cervical, thoracic ROM is limited.
 - Right shoulder ROM is limited in all planes due to pain, fear, and soft-tissue impairments.
- **Strength & Muscle Length:**
 - Right shoulder and peri-scapular muscle weakness present
 - Decreased muscle length noted in the latissimus dorsi, pectoralis major, and posterior rotator cuff muscles.
- **Palpation:**
 - Tenderness over the anterior-lateral and poster shoulder.
- **MF Restriction:**
 - Posterior shoulder, upper trapezius, levator scapulae interstion
- **Special Testing: (+) for shoulder impingement**

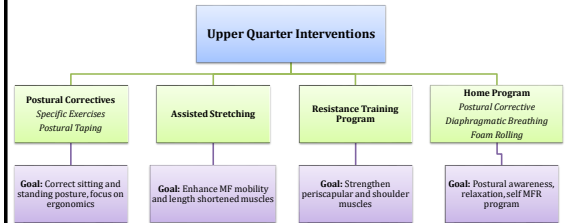
Confirmatory Diagnosis

- **DX:** Finding consistent with right shoulder impingement secondary to postural dysfunction
- **Treatment Plan:** (1-2x 4 weeks)
 - **Right Shoulder Impingement:** pain control, restoration of ROM, muscle length, and strength
 - **Cervicothoracic Hypomobility:** restore joint mobility
 - **Posture Dysfunction:** Correct both standing and seated postural dysfunctions.
 - **MF Restriction/Muscle Length Deficits:** Assisted and self-myofascial release, stretching
 - **Strength Deficits:** Periscapular and shoulder muscle strengthening
 - **Patient Ed:** Focus on work ergonomics and body mechanics
 - **Home program:** Develop maintenance gym and home program and refer to fitness professional for further training.

Manual Treatment

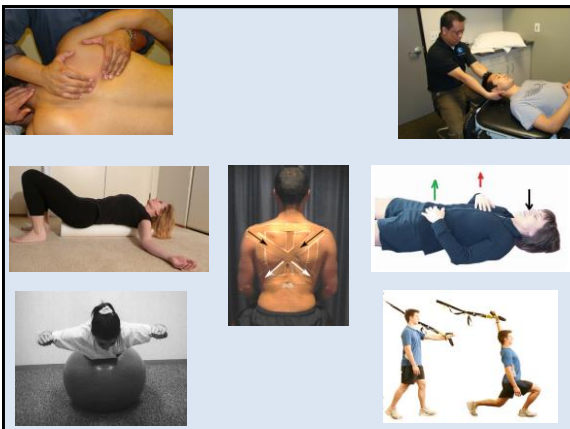


Therapeutic Exercise



General conditioning

- Basic upper/lower body strengthening program
- Standard cardiorespiratory program



Case Study #2

Non-Specific Low Back Pain

Case History

- **Patient:** Male (33 year-old)
 - Wt:190 lbs, Ht. 65 inches (Endomorphic build)
 - Occupation: Regional Sales Manager
 - Physical Activity: Racket ball (2x week)
- **Mechanism:** Insidious onset of bilateral low back pain 6 weeks ago.
 - Low back began to hurt after sitting and driving for extended hours
- **Current Symptoms:**
 - Intermittent "ache" in central low back with static activities
 - Low back hurts after 30 minutes of driving or computer work
 - No symptoms of referral down the either leg
- **Diagnosis:** Non-specific lowback pain
 - MRI (-) mild degenerative changes, Radiograph (-)

Initial Examination

- **Initial Examination:** 1 week after referral
 - Pt cleared by physician for physical therapy and development of home exercise program
- **Functional Status:**
 - Pt still working full-time with limited static activity to 30 minutes
- **Aggravating Factors:**
 - Prolonged sitting, standing, lifting heavy objects, and bending
- **Relieving Factors:** Rest and meds
- **Pain:**
 - Worst: 6/10 pain with aggravating factors
 - Average: 3/10 with activities of daily living
 - Best: 2/10 pain with medication
- **Medication:** NSAID (PRN), Meds for HTN
- **Systems Review:** Insignificant for medical "red flags"

Test & Measures

- **Observations/Screen**
 - Vascular (WNL)
 - Inspection (WNL)
- **Posture**
 - Standing: Sway-Back Posture
 - Seated: Slouched posture with increase thoracolumbar kyphosis
- **Posture: Lower Extremity**
 - Standing: right shift through lumbar spine
 - Hip, knee, ankle alignment (WFL)



Test & Measures

Muscle Performance

Motion Tested	Right	Left
Hip Flexion	4/5	4/5
Hip Extension (knee bent + straight)	3/5	3/5
Hip Abduction	3/5	3/5
Hip Adduction	4/5	4/5
Hip Internal Rotation	4/5	4/5
Hip External Rotation	3+/5	3+/5
Single Leg Squat	Weak	Weak
Inner Abdominal Core	Weak	
Plank Test	Weak	

Hip and Spine ROM

Motion Tested	Right	Left
Hip Internal Rotation	35°	35°
Hip External Rotation	40°	40°
Hip Flexion	WNL	WNL
Hip Extension	5°	5°
Hip Abduction	WNL	WNL
Hip Adduction	WNL	WNL
Side Bending	15% deficit	15% deficit
Thoracolumbar Flexion	40% deficit	
Thoracolumbar Extension	30% deficit	

Test & Measures

- | | |
|--|--|
| <p>Muscle Length/Palpation</p> <ul style="list-style-type: none"> • Thomas (+) R+L • Ely's (+) R+L • 90/90 Hamstring (+) R+L • Ober's (+) R>L • Palpation <ul style="list-style-type: none"> – 2/5 over lumbar L3-L5 bilateral paraspinals • MF restriction <ul style="list-style-type: none"> – Lumbar paraspinals, bilateral quadratus lumborum, multifidi, anterior hip muscles | <p>Joint Mobility/Special Testing</p> <ul style="list-style-type: none"> • Joint Mobility <ul style="list-style-type: none"> – Spine: T10-L5 Hypomobile – Ribs: T8-T11 costovertebral hypomobility • Special Testing: <ul style="list-style-type: none"> – SLR (-) R+L – Slump Test (-) – DTR and Dermatomes (WNL) |
|--|--|

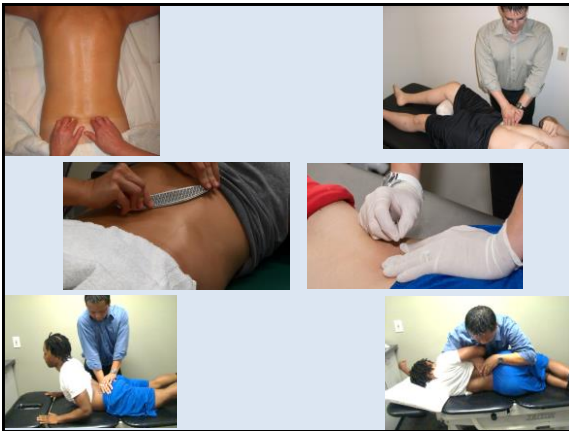
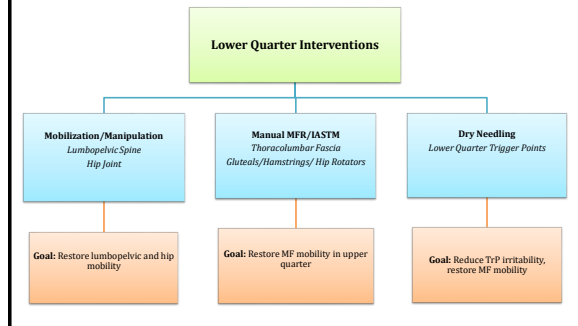
Assessment

- **Posture & ROM:**
 - Sway-Back Posture with increase slouching during sitting.
 - Hip and thoracolumbar ROM is limited.
- **Strength & Muscle Length:**
 - Bilateral hip and abdominal core weakness
 - Decreased muscle length noted in the hip flexors, quadriceps, hamstrings, and hip external rotators.
- **Palpation:**
 - Tenderness over the lumbar paraspinals.
- **MF Restriction:**
 - Lumbar paraspinals, bilateral quadratus lumborum, multifidi, anterior hip muscles
- **Special Testing:** (-) for intervertebral disc related pathology

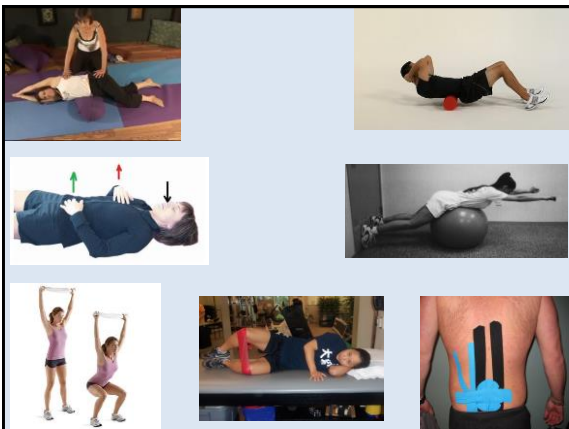
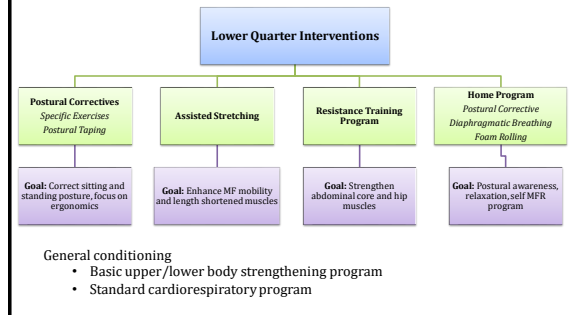
Confirmatory Diagnosis

- **DX:** Finding consistent with non-specific low back pain with poor posture, lumbopelvic hip muscle weakness.
- **Treatment Plan:**
 - *Lumbar spine Hypomobility:* pain control, restoration of ROM, muscle length, and abdominal core strength
 - *Hip Joint Hypomobility:* restore joint mobility
 - *Posture Dysfunction:* Correct both standing and seated postural dysfunctions.
 - *MF restriction/Muscle Length Deficits:* Assisted and self-myofascial release, stretching
 - *Strength Deficits:* Hip and abdominal core strengthening
 - *Patient Ed:* Focus on work ergonomics and body mechanics
 - *Home program:* Develop maintenance gym and home program

Manual Treatment



Therapeutic Exercise



Questions?

Contact Info:

Scott Cheatham

Email: Scheatham@csudh.edu

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