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Shoulder Preservation in Spinal Cord Injury

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for www.occupationaltherapy.com August 25, 2015

Disclosures

I do receive an honorarium for presenting this course. I do not receive any compensation from any manufacturer or vendor.

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Objectives

After this course, participants will be able to:

- ▶ Recognize the causes of shoulder pain in patients with spinal cord injury.
- ▶ Identify strategies for the prevention of shoulder pain in patients with spinal cord injury.
- ▶ Select appropriate intervention strategies for the remediation of shoulder pain in patients with spinal cord injury, based on pain profile.

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A Big Pain!

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Prevalence

- ▶ 30-78% of patients with SCI
- ▶ Higher in tetraplegia
- ▶ Appears in first 6-12 months post injury

PVA Clinical Practice Guidelines, 2005

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Causes

- ▶ Neurogenic shoulder instability
 - ▶ Paralysis
 - ▶ Weakness and imbalance
- ▶ Overuse/ repetitive motion
 - ▶ Transfers
 - ▶ Wheelchair propulsion
- ▶ Cervical/upper quadrant issues
- ▶ Neurogenic pain
- ▶ Degenerative changes

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Impact

- ▶ Worsening disability,
 - ▶ 80% report interruption in sleep
 - ▶ 26% need additional help with functional activities
 - ▶ 28% report reduction in independence
 - ▶ 21.4% unemployed
- ▶ Pain and associated disability
 - ▶ Correlates strongly with decreased QOL
- ▶ Cost
 - ▶ Transportation
 - ▶ Caregiver
 - ▶ Environmental modifications
 - ▶ Additional health care costs

Figoni, 2009; Lundqvist et al., 1991; Dalyan et al., 1999

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The shoulder joint

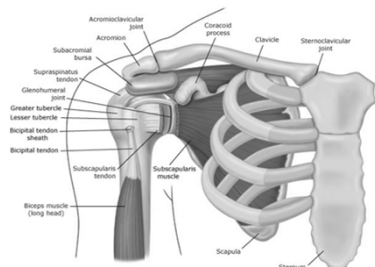
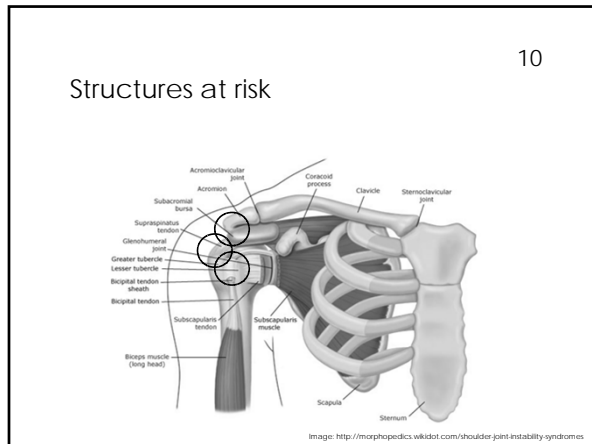
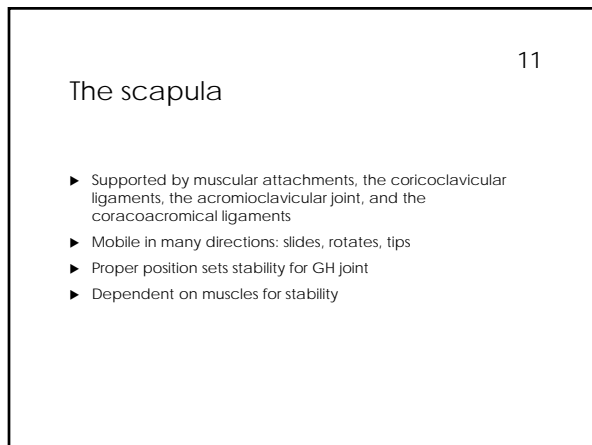
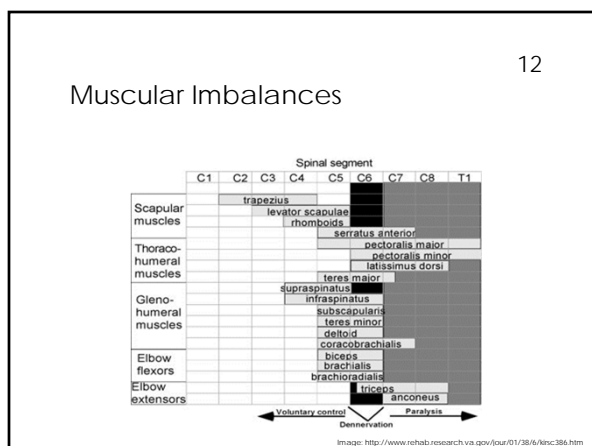
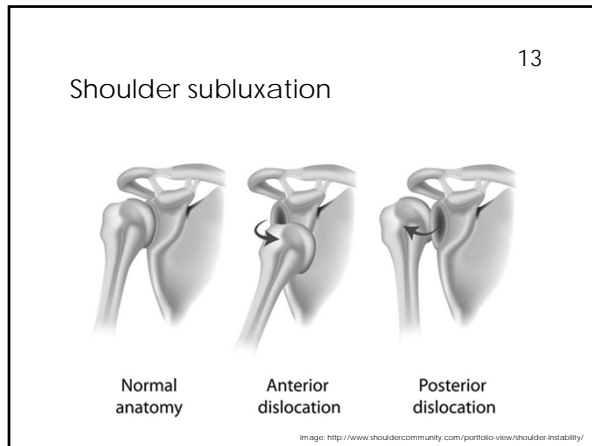


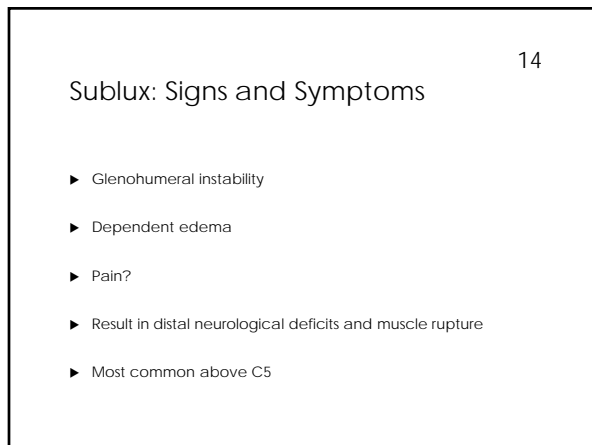
Image: <http://morphopedics.wikidot.com/shoulder-joint-instability-syndromes>

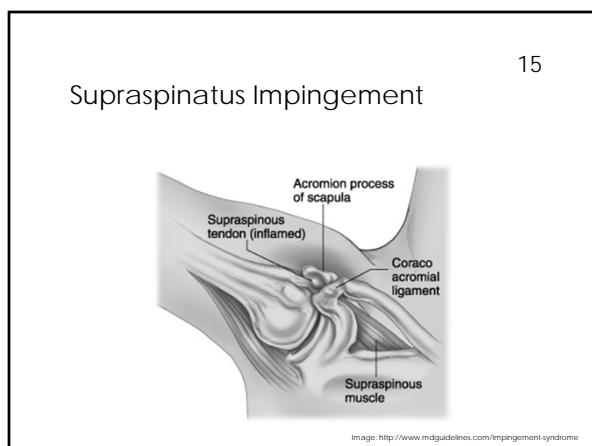












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Impingement: Signs & Symptoms

- ▶ Pain in lateral, superior, anterior shoulder
- ▶ Gradual onset, worsens with overhead activity
- ▶ Pain is recreated with shoulder flexion and internal rotation

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Bicipital Tendonitis SIGNS

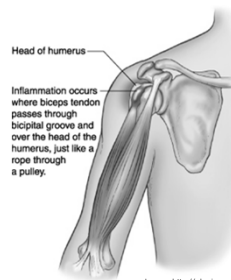


Image: <http://physioworks.com.au/injuries-conditions/1/biceps-tendonitis>

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Tendonitis: Signs and Symptoms

- ▶ Pain or tenderness over anterior shoulder, worsens with overhead reaching
- ▶ Pain radiates distally
- ▶ May have loss of strength
- ▶ Often accompanies chronic GH instability or impingement

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Prevention

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Maintain optimal health status

- ▶ Prevalence of UE pain and its impact
- ▶ Regular exercise, activity
 - ▶ Not move less
 - ▶ Move smarter
- ▶ Healthy weight

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Minimize the frequency of tasks

- ▶ Reduce frequency of transfers, especially unlevel
- ▶ Provide variety in vocational and avocational activities
- ▶ Proper wheelchair propulsion

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Wheelchair propulsion

The tiny push



Arc

The choo choo



Semi Circular

Image: <http://icord.org/2015/02/maintaining-arm-health-in-wheelchair-users-the-need-for-updated-guidelines/>

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Minimize force required for tasks

- ▶ Maintain healthy weight
- ▶ Improve wheelchair propulsion
- ▶ Ensure optimal biomechanics
 - ▶ Keep items close to the body
 - ▶ Weight bear through long bones
- ▶ Minimize heavy loads

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Minimize extreme positions

- ▶ Wrist
 - ▶ Extension (transfers)
- ▶ Shoulder
 - ▶ Flexion (overhead reaching)
 - ▶ Impingement of supraspinatus between humerus and coracoacromial arch, worse with internal rotation
 - ▶ Internal rotation (w/c propulsion)
 - ▶ Abduction

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Wheelchair options



Pride Quantum 600
TiLite TX
Emotion Wheels

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Power mobility

PROS

- ▶ Reduce repetitive motion
- ▶ Conserve energy
- ▶ Increased speed
- ▶ Greater ease on uneven terrain

CONS

- ▶ Accessibility
- ▶ Maintenance
- ▶ Cost
- ▶ Decreased activity (weight gain and fitness)

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Manual mobility

PROS


- ▶ Light weight
 - ▶ Consider weight of add ons (back rest, cushion)
 - ▶ Keep added weight under chair, not on backrest
- ▶ Fully customizable
 - ▶ Back angle
 - ▶ Seat height/ dump
 - ▶ Hanger/foot rest angle
 - ▶ Adjust rear axle forward
- ▶ Enhanced community accessibility

CONS


- ▶ Put a lot of stress on shoulder
 - ▶ Educate re: push pattern
- ▶ Sitting posture may deteriorate
 - ▶ Optimize sitting posture

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Power assist options



Emotion Power Assist Wheels



E-fix Electric Drive for Manual Wheelchair

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Power assist mobility

PROS

- ▶ Reduce force and repetition associated with push
- ▶ Maintain accessibility of manual wheelchair

CONS

- ▶ Add significant weight to wheelchair

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Bed positioning

- ▶ Avoid direct pressure on the shoulder
- ▶ Provide support to the upper limb at all points
- ▶ When the individual is supine, position the upper limb in abduction and external rotation
- ▶ Avoid pulling on the arm

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Shoulder should be in external rotation

Arm should be elevated

Head should be rotated out of the midline

Shoulder should be in approximately 75 degrees of abduction

Shoulder should be in approximately 75 degrees of abduction or higher

Bed Positioning

Preservation of Upper Limb Function Following Spinal Cord Injury: A Clinical Practice Guideline for Healthcare Professionals

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Transfers

- ▶ Go level when possible
- ▶ Vary the direction
- ▶ Avoid positions of impingement
- ▶ Use a handgrip when possible
- ▶ Consider a transfer assist device

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Exercise

- ▶ Individualized, progressive
- ▶ Stretching for anterior quadrant (neck, pec, external rotators)
 - ▶ Reverse forward head, rounded shoulders
 - ▶ Lengthen muscles shortened by transfers/pushing
- ▶ Strengthening for posterior quadrant (shoulder depressors and scapular stabilizers)
 - ▶ Help maintain posture
 - ▶ Restore muscular imbalances that contribute to impingement

Shoulder Pain in Chronic SCI: A case series

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- ▶ Shoulder specific evaluation with analog pain rating, functional mobility assessment, Wheelchair Users Shoulder Pain Index (WUSPI), and provocative shoulder testing
- ▶ 6 week shoulder specific home program
- ▶ 4 daily muscle stretches and 6 strengthening exercises 3x/week
- ▶ One-time training session on activity modification (transfer training, propulsion pattern assessment) and home program

Participants Demographics (N=15)

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- ▶ Shoulder pain reported at physical or occupational therapy evaluation
- ▶ Injury level : Cervical=8, Thoracic=7
- ▶ Pre-existing shoulder diagnoses
 - ▶ Previous Dislocation: 3
 - ▶ Rotator Cuff Tear: 3
 - ▶ Impingement: 1
- ▶ Average pain rating at initial evaluation: 6.23

Participants

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Stretching Program

Pectoralis

Biceps

Upper Trap

Posterior Capsule



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Strengthening Program

External Rotation

Protraction

Retraction



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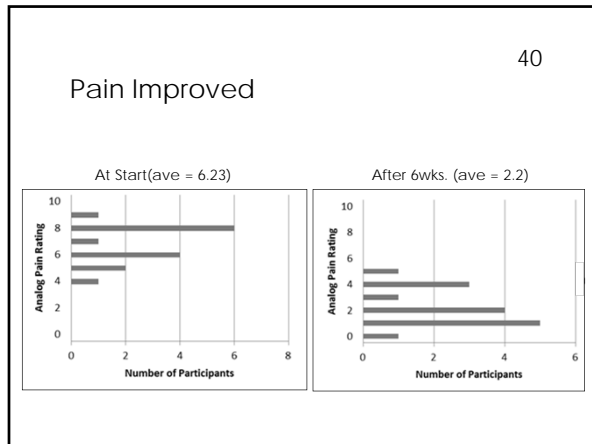
Strengthening Program

*I's, *T's, and *Y's

Serratus Punches

Serratus Push-up with Ext. Rot.







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- ### Management of Pain
- ▶ Treat musculoskeletal issues in SCI as in normal population
 - ▶ Intervene as early as possible
 - ▶ Relative rest
 - ▶ Night splints
 - ▶ Home modifications
 - ▶ Short term admissions for rest
 - ▶ Gradual return to activity

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Conservative treatment for bursitis and tendonitis

- ▶ Relative rest
- ▶ Nonsteroidal anti-inflammatory and corticosteroid medication
 - ▶ Oral
 - ▶ Iontophoresis/Phonophoresis
 - ▶ Injections
- ▶ Cold/heat/ultrasound
- ▶ Correction of postural abnormalities, muscle imbalances, ROM, improper kinematics

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Surgical Options

- ▶ Rotator cuff and ruptured tendon repairs
- ▶ Anterior acromioplasty to decompress the subacromial space and relieve impingement
- ▶ Outcomes are mixed, influenced by muscular imbalances and pre-op joint instability
- ▶ Rehab is key!

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Rehabilitation Approaches

- ▶ Relative rest and pain relief
- ▶ Strengthen around
- ▶ Retrain kinematics

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Relative Rest

- ▶ Adaptive Equipment
 - ▶ Reachers
 - ▶ Standing frames
 - ▶ Power/power-assist mobility
- ▶ Splinting/taping for support

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Taping

- ▶ Kinesiotape: cotton tape with elastic properties
 - ▶ Support or facilitate motion
 - ▶ Reduce edema
 - ▶ Inhibit motion
- ▶ Leukotape: rigid silk tape
 - ▶ Hold a position
 - ▶ Restrict motion

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For shoulder support

Deltoid facilitation
AC jt. correction
External rotation correction



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Strengthening

- ▶ Progressive resistive exercise, focus on posterior aspect
- ▶ Augment with electrical stimulation

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To reduce shoulder subluxation

- ▶ 29yo man with CCS and (B) shoulder sublux
- ▶ Treatment
 - ▶ ES to middle/anterior deltoid and supraspinatus 2x30min/day
 - ▶ Leukotape to facilitate GH approximation, via anterior and middle deltoid, over the electrodes

	UEMS	(R) Sublux	(L) Sublux
Admit	26/50	1.5 cm	1.0 cm
D/C	48/50	0.3 cm	0.2 cm

Peterson, 2004

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Retraining Kinematics

- ▶ Minimize compensation
- ▶ Optimize kinematics
- ▶ Maximize weight bearing
- ▶ Optimize sensory cues

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Keys to Shoulder Preservation in SCI

- ▶ Prevention is best!
 - ▶ Reduce force and frequency

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Keys to Shoulder Preservation in SCI

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- ▶ Maintain optimal health status

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Keys to Shoulder Preservation in SCI

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- ▶ Exercise is important
 - ▶ Stretch anterior, strengthen posterior

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Keys to Shoulder Preservation in SCI

- ▶ Prevention is best!
 - ▶ Reduce force and frequency
- ▶ Maintain optimal health status
- ▶ Exercise is important
 - ▶ Stretch anterior, strengthen posterior
- ▶ Treat musculoskeletal issues as you would in normals

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Questions

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For more information:

- ▶ martinre@kennedykrieger.org
- ▶ www.abrttraining.kennedykrieger.org
- ▶ www.scicpg.org/cpg_cons_pdf/Upper_Limb_Consumer_Guide.pdf
