Management of the Hemiplegic Shoulder

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AOTA Student Conclave
November, 16th 2013

Learning Objectives

- Understand basic shoulder anatomy & kinesiology
- Report proposed causes of hemiplegic shoulder pain
- Explain prevention of hemiplegic shoulder pain & complications
- Report evidence behind treatment techniques and management for the hemiplegic shoulder, both flaccid & spastic
- Understand the role of the OT in the treatment team for hemiplegic shoulder pain

Shoulder Basics

- Understanding the anatomy and physiology of the shoulder complex is essential to understanding the hemiplegic shoulder
- The shoulder has the greatest range of motion of any joint in the body
  - This allows us to reach, lift, push & pull in many directions
- Stability of the shoulder is at the sake of this mobility
  - Soft tissues are responsible for the stability of the shoulder
Bones of the Shoulder Complex

- Made up of five bone groups
  - Humerus
  - Scapula
  - Clavicle
  - Sternum
  - Ribs (posterior)

Joints of the Shoulder Complex

- Made up of four joints:
  - Glenohumeral
  - Acromioclavicular
  - Sternoclavicular
  - Scapulothoracic
  - Several strong ligaments provide stability

Muscles of the Shoulder Complex

- Connect skull or spine to scapula and clavicle
  - Trapezius, levator scapulae, rhomboids
- Connect proximal humerus to trunk
  - Pectoralis major, pectoralis minor, latissimus dorsi, teres major, teres minor, deltoid
- Arm muscles that enter the shoulder complex
  - Biceps brachii, triceps brachii, coracobrachialis
Muscles of the Rotator Cuff

- Play a large role in keeping the humeral head in the glenoid fossa
- Supraspinatus
- Infraspinatus
- Teres minor
- Subscapularis

Scapulohumeral Rhythm

- There is a 2:1 ratio for movement of the humerus in relation to the movement of the scapula during shoulder flexion and abduction
  - Glenohumeral flexion or abduction
  - Scapular upward rotation

Between 60-120 deg of shoulder flexion and abduction, external rotation of the humerus is essential to avoid impingement!

Formulating Conclusions Based on Levels of Evidence (from EBRSR, 2011)

- **Level 1a (Strong):** Evidence is supported from a meta-analysis or at least two RCTs of fair quality or better
- **Level 1b (Moderate):** Evidence is supported by only one RCT of at least fair quality
- **Level 2 (Limited):** The findings were supported by at least one controlled trial with a minimum of 10 subjects in each arm
- **Level 3 (Consensus):** The lowest form of evidence. Consensus is the opinion of a group of experts in the absence of evidence
- **Level 4 (Conflicting):** Disagreement between the results of at least two RCTs
Incidence of Hemiplegic Shoulder Pain (HSP)
- Incidence of HSP varies between 9-73% in research
- Gamble et al. (2002) reported in a prospective study of 134 patients that 34% developed shoulder pain following stroke
  - Of patients reporting pain, 28% had pain by two weeks & 87% had pain by two months
  - By 6 months, the pain had resolved in 80% the patients
  Teasell et al. 2011

The trouble with pain is…
- Development of hemiplegic shoulder pain is associated with:
  - Decreased functional outcomes
  - Depression
  - Increased risk of secondary shoulder complications
  - Increased medical and rehab costs
  Teasell et al. 2011

Causes of Hemiplegic Shoulder Pain
- Many etiologies have been proposed and researched:
  - Glenohumeral Subluxation
  - Spasticity
  - Rotator Cuff Tear
  - Adhesive Capsulitis
  - Reflex Sympathetic Dystrophy
  - Bursitis
  - Tendonitis
  Teasell et al. 2011
Causes of Hemiplegic Shoulder Pain

Shoulder subluxation: Conflicting evidence
- 8 large studies support, 11 do not support role of subluxation in pain
- Not all patients with subluxation have pain!
  - During the initial hypotonic stage, gravity or other external forces may pull the humerus inferiorly
  - Many times synergistic flexors & internal rotators are active, which pull the humerus anteriorly
  
Teasell et al. 2011

Causes of Hemiplegic Shoulder Pain

Aggressive ROM: Moderate evidence
- Forced stretches, pulleys, pulling on affected arm, passive movement of the humerus >90 deg shoulder flexion or abduction with absent scapular rotation

Teasell et al. 2011

Causes of Hemiplegic Shoulder Pain

Hypertonicity & spasticity: Association
- Increasingly believed to be the cause of most cases of HSP
- Spastic muscle imbalance results from overactive shoulder internal rotators and adductors and underactive antagonists
  - Spastic subscapularis & pectoralis are most often associated with pain, also the teres major & latissimus dorsi to a lesser extent
Causes of Hemiplegic Shoulder Pain

- **Adhesive Capsulitis: Association**
  - Characterized by limited active and passive range of motion and adhesions of the shoulder capsule
  - Spastic muscle imbalance can lead to a contracted, or frozen shoulder and is almost always associated with pain

  Teasell et al. 2011

Approaches to Hemiplegic Shoulder Management

- **Preventative:**
  - Avoid the impairment from occurring or from getting worse

- **Restorative:**
  - Make the impairment better

- **Compensatory:**
  - Improve individual’s ability to function despite the impairment

Preventative: Positioning

- Consensus opinion that proper positioning helps to prevent or alleviate subluxation and pain
- Conflicting evidence that proper positioning prevents loss of active or passive range of motion

Teasell et al. 2011
Preventative: Slings & Supports

- Systematic review found limited evidence that slings prevent or improve HSP or subluxation.
- Of note, the supports studied: Hook-hemi harness, shoulder roll, lap tray, arm trough, Bobath sling, Harris hemi-sling, Roylan humeral cuff sling, single-strap hemi sling.
- Clinical consensus: it is prudent to support the flaccid UE.
- Disadvantages to standard slings: encourage flexor synergy, limit arm swing, inhibit functional use of arm.

Preventative: Giv Mohr Sling

- Dieruf, K., et al. (2012) found statistically significant increase in gait velocity when wearing Giv Mohr sling vs not wearing sling in patients who had sustained CVA.
- Notice the difference in the positioning of the arm!

Strapping and Taping

- Conflicting evidence that strapping reduces the development of pain, moderate evidence that it does not improve function.
- Based on systematic review of literature using different brands of tapes and taping techniques.
- Kinesiotape, in particular, has very limited research in the neurologic population, but one study that reported a reduction in pain.
- Clinically, we have found that many patients report decreased pain.

Trassell et al. 2011
Restorative: Active Therapies
- Moderate evidence supporting active therapy oriented approach as opposed to a passive therapy approach in reducing pain
  - Goal: Improve active range of motion and prevent contracture development.
  - Goal: Strengthen antagonists of the hypertonic/spastic muscles

Restorative: Range of Motion
- Moderate evidence that gentle range of motion program initiated by a therapist helps reduce pain
  - Never stretch to the point of pain
  - Instruct patient and family in self and passive range of motion, active assist range of motion is preferred
  - Warm up with slow & gentle active assist in particularly tight muscle groups. Gradually increase load, but never to a point of pain!

Restorative: Electrical Stimulation
- Strong evidence that electrical stimulation prevents the development of shoulder subluxation, strong evidence that electrical stimulation can also reduce shoulder subluxation
  - Protocol: Supraspinatus & posterior deltoid 6 hrs/day, 5 days/wk, 6 wks.
  - Strong evidence that electrical stimulation does not reduce hemiplegic shoulder pain.

Teasell, et al., 2011
Restorative: Electrical Stimulation

- Research pertaining to electrical stimulation stresses the importance of active engagement of the patient during the stimulation!
- This can be used in conjunction with the active therapy approach

Spasticity

- There is strong evidence that physical therapy alone does not reduce spasticity in the upper extremity
- Spasticity is an upper motor neuron disruption!
- If spasticity appears to be the cause of HSP, it is important for the OT to work with the medical team to address possible medication management, both for spasticity and for local pain relief

Spasticity and Medical Management

- If the MD chooses medical management, the occupational therapist plays an important role in reporting efficacy
  - Oral Medications: Such as Baclofen, Benzodiazepines, Imidazolines among others may be used to relax muscles.
  - Injections: Medications to block nerves and relieve spasticity in certain muscles/muscle groups.
  - Intrathecal baclofen therapy: For more chronic cases, a pump that delivers baclofen directly to the spinal cord provides targeted spasticity relief.
Spasticity and Medical Management

- Conflicting evidence that botulinum toxin alone significantly reduces spasticity in the upper extremity.
- Moderate evidence that electrical stimulation in conjunction with botulinum toxin injections further reduced muscle tone.
- Strong evidence that physical therapy in conjunction with botulinum toxin is associated with improved function of the upper extremity.

Foley, et al 2011

References

How to create a ponytail:

1) Open the elastic with the bead or button and knot together on the outside of all your fingers.

5) Use your fingers to open the second circle and reapply to ponytail.

Learning to use the one-handed ponytail device will take practice, so be patient.

Tips:

Adjustments to the length of the elastic can make it tighter, depending on your hair thickness. You can make it tighter by tying another knot.

Learning to create the ponytail is easier if your hair is wet and perhaps already in a ponytail someone else has helped you do.

If mastering the skill is too frustrating, you can ask for an occupational therapy referral.

For more information or to order one-handed ponytail device kits, visit us online at www.one-handedponytail.com or www.facebook.com/one-handedponytail.

The one-handed ponytail device was invented by Sara D. Uhrig OTR/L, CHT, a registered, licensed occupational therapist and certified hand therapist. The One-Handed Ponytail Device was published in the Journal of Hand Therapy in 1996.

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Tommye-K. Mayer's Three Secrets to Managing Single-Handedly

the Three Secrets make it possible for you manage what most people use two hands to accomplish.

1) Body Positioning

The First Secret to managing single-handedly is learning how to position your body to enable you to accomplish what you want. It may be as straightforward as changing where or how you stand, or repositioning those body parts you can use so that your one hand can accomplish the project you've undertaken.

2) Four Fingers and a Thumb

The Second Secret is to recognize that you don't have just one hand—you have four fingers and a thumb, each of which works independently of the others. Once you stop thinking of having one hand and start using all four fingers and your thumb, you can accomplish most of what you try by coupling your new thinking with the First Secret.

3) Gadgets

The Third Secret to managing single-handedly is using a “gadget” (Assistive Device). I consider gadgets the secret of last resort because, while they can be key to succeeding with specific tasks, the gadget you've come to rely on may not always be available. Some are indispensable, especially at home, and my suggested checklist should help you get started. In that your experience and situation will inevitably differ from mine, or because you may be more enamored of gadgets than I am (they make terrific gifts to give yourself or to receive), I offer resolutions using all Three Secrets. If Body Positioning or Four Fingers and a Thumb doesn't work for you, by all means try a gadget—one I describe, or something you discover for yourself.
Tommye-K. Mayer’s 10 Essential Gadgets for Managing Single-Handedly

- **Cuisinart SmartStick Infuser.** This handheld blender with a simple one-touch control blends and mixes everything single-handedly.
- **Cutting Board.** This particular model tool includes a small vise and the ability to cover the nails on which you impale what you want to cut or slice, providing a safe flat workspace.
- **Dental Flossers.** This is the only way to single-handedly and effectively remove plaque between teeth and below the gum line, where periodontal disease starts.
- **Dycem.** This non-slip material solves many of the stabilization and gripping problems of managing single-handedly.
- **Long-Handled Bath Brush.** This long-lasting, natural-bristle bath brush has an 18-inch long handle for a single-handed all-over body scrub and massage.
- **Lotion Applicator.** The pad of this applicator is about the size and shape of a bar of soap. It is sculpted and contoured on the edges, attached to a handle long enough to reach all of your back.
- **Paper Clips.** I use the jumbo size to clip together pages I've read in a book, allowing me to move my hand without losing my place.
- **Stringy Stress Ball.** I am so excited about this idea that came to me after much thought. I use it to help me wash my one hand and, since I have, I've had far fewer viruses and colds.
- **Suction Cup Pads.** A 2-inch oblong rubbery pad with ¼ " suction cups on both sides—great for firmly holding in place whatever you're working on.
- **Winged Corkscrew.** Because grown-ups should be able to open a bottle of wine for themselves.

*Tommye-K. Mayer’s 10 Essential Gadgets for Managing Single-Handedly* are all available through the PrinceGallison aStore

http://www.PrinceGallison.com
Tommye-K. Mayer’s 10 More Gadgets I Wouldn’t Want to Do Without

- **Fanny Packs.** The ultimate single-handed pocketbook. Worn strapped around your waist, these packs free your one arm and hand.

- **Grab Bars.** This safety addition to your bathroom provides a solid handhold in a small space where you’re often soaking wet and covered with slippery soap.

- **Kitchen Soap Dispenser.** Always where you need it, when you need it; eliminates bending down and rummage through the under-sink cabinet or clattering the counter with plastic soap bottles. Simply press down when you need soap.

- **Kitchen Towel Grabber.** This “V” design bracket to hold kitchen towels can be easily attached to the refrigerator, for example, putting the kitchen towel securely right there where you need it so you can wipe your one hand against the towel without having to find an pick up the towel.

- **Necklace Shortener.** Use a necklace shortener to clasp your opera or rope-length necklaces close around your neck at the choker or princess length.

- **Paperweight.** Keep one on your desk that is heavy enough to stabilize a sheet of paper on a smooth desktop to prevent documents from sliding around.

- **Roomba.** The iRobot vacuum cleaner that makes cleaning floors and carpets a breeze.

- **Spice Clips.** Easily installed plastic clips let you to hang your spice bottles on the wall.

- **Suction-Cup-Base Nail Brush.** This fingernail cleaning brush can be attached to the bathroom sink basin, allowing you to clean under your fingernails.

- **Terrycloth Robe.** Put one on as you step out of the shower to thoroughly dry off not just your back, but most of your body too.

Tommye-K. Mayer’s 10 Essential Gadgets for Managing Single-Handedly are all available through the PrinceGallison aStore

http://www.PrinceGallison.com