Hypermobility 111: Cervical Instability (Part 2)

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- Part 1 discusses anatomy and testing; it is available on my website.
- Slide handouts and recording available at: https://webspace.clarkson.edu/~lrussek/hsd.html

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Who Am I?

- Professor Emeritus, Physical Therapy Dept, Clarkson University
- Staff PT, St. Lawrence Health System, Potsdam NY
  - Clinical specialties: hypermobility, fibromyalgia, headaches, temporomandibular disorders
- Frequent presenter to professional and patient groups at national conferences
- Author of multiple review and research articles on hypermobility
- Member of the Allied Health Working Group of the International Consortium of Ehlers-Danlos Syndromes and Hypermobility Spectrum Disorders
- National Academy of Science and Engineering Committee on Selected Heritable Connective Tissue Disorders and Disability
- Lead author of "Presentation and physical therapy management of upper cervical instability in patients with symptomatic generalized joint hypermobility: International expert consensus recommendations"
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I do not have any conflicts of interest to report

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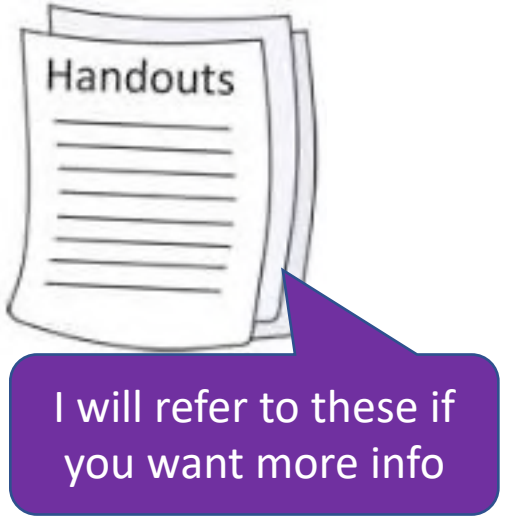
Hypermobility Lecture Series

- HSD 101: Basics of HSD/hEDS and self-care
- 9/24/21 - HSD 102: POTS and POTS self-care, basics of MCAS
- HSD 103: Pain management in HSD/hEDS
- HSD 104: Safe exercise selection and progression with HSD/hEDS
- HSD 105: NEW: Posture and joint protection
- HSD 106: Gut issues in HSD/hEDS, POTS, MCAS
- HSD 107: Fatigue in HSD/hEDS and POTS
- HSD 108: Headaches, migraines, and TMJ pain in HSD, POTS and MCAS
- HSD 109: Breathing dysfunctions in HSD
- HSD 110: Lumbar instability
- HSD 111: Cervical instability, Part 1 (anatomy and diagnostic testing) is recorded. Part 2 today
- HSD 112: Activating the vagus nerve to manage HSD, POTS and MCAS
- HSD 113: The role of fascia

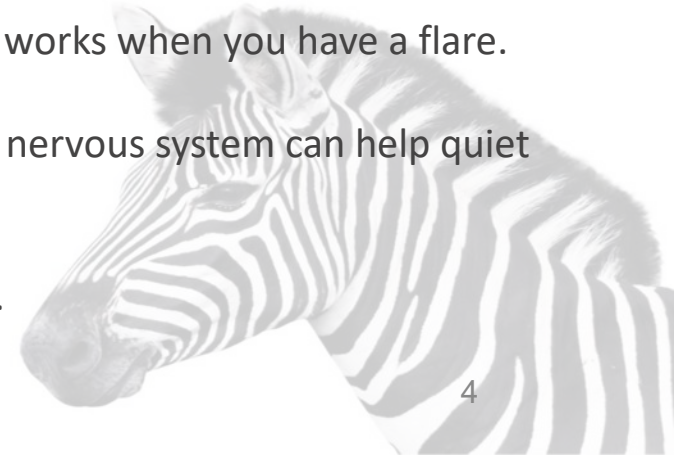
I will refer to these if you want more info

Relevant Handouts Available



https://webspace.clarkson.edu/~lrussek/research.html

- **Cervical Instability:**
  - Upper cervical Instability. (UCI). Patient handout. Full text of UCI article.
  - **NEW!** A very comprehensive patient guide to EDS cervical instability by EDSawareness.
- **Self-Care Strategies**
  - Breathing. Breathing incorrectly can increase cervical instability, pain sensitivity, headaches, & jaw pain
  - Posture. Good posture decreases strain on muscles and joints, and can prevent many problems.
  - Joint Protection Strategies Learning to protect your joints and muscles is the first step towards healthier and stronger joints.
  - Sleep Hygiene and Positioning. Sleep posture and sleep hygiene strategies.
  - Headache Trigger Points. Many headaches are caused by trigger points from overactive muscles trying to stabilize the neck.
- **Pain Management**
  - Pain flare management plan - PDF version. Create a flare management plan so you know what works when you have a flare. PDF version to print. Word version so you can type your info in.
  - Heart-rate variability biofeedback. Biofeedback to increase activation of your parasympathetic nervous system can help quiet sensitive nerves and decrease pain.
  - Free chronic pain management apps for teens
  - Curable chronic pain management app. Cognitive behavioral approaches to pain management.



DISCLAIMER

The information in this presentation is for general purposes, only, and may or may not apply to your situation.
Check with your health care provider
before starting any new exercises or treatments,
to ensure that they are appropriate and safe for YOU.

I cannot diagnose you or provide personal medical recommendations, and this lecture should not be used for those purposes.

Objectives

Part 1 (recording on website):

1. *Identify key anatomical structures affected by instability*
2. *Recognize signs and symptoms of cervical instability affecting different structures*
3. *Identify appropriate diagnostic testing for different problems*

Part 2 (today)

At the end of today's session, participants should be able to:

1. List signs and symptoms of cervical instability
   - Focus will be on upper cervical instability, which is often more severe
2. Identify things you can do to minimize cervical instability
3. Recognize when conservative care (PT and self-care) can manage cervical instability, and when you might need to see a neurologist or neurosurgeon

Understanding Instability

What Is Cervical Instability?

- Inability to control spinal movement within the ‘neutral zone’
- Cervical stability is normally a combination of:
  - Passive structures, such as the disc, facet joints and ligaments
  - Muscles acting on or affecting the spine
  - Neurological system (brain and nerves) that controls the muscles
- People with hypermobility have stretchy passive structures
- **BUT, what makes the spine unstable is failure of the muscles and nervous system to provide control**

Is It Cervical Instability?

The next few slides are in my Upper Cervical Instability handout

The following 3 criteria should be met:

1. Signs & symptoms of cervical instability (looks like cervical instability)
   - *(signs and symptoms consistent with cervical instability)*
2. Symptoms are affected by neck movement or position (caused by the neck)
   - *(related to the neck movement, not due to other causes)*
3. Instability symptoms are irritable (easily provoked) and slow to calm down (unstable/irritable)
   - *(not just due to the neck, but due to neck instability)*

Musculoskeletal Signs & Symptoms of Cervical Instability

	Com-mon	Diag-nostic
Heavy/bobble head, feel like you need to support or brace your head to decrease symptoms		X
Apprehension about beginning or controlling neck movement or travel in vehicle		X
Lump in throat, trouble swallowing		X
Consistent clicking or clunking in the neck associated with neck movement *		X
Cervical sensorimotor symptoms such as tinnitus, dizziness *		X
Suboccipital headaches *	X	
Yoke/coat-hanger distribution pain *	X	
Neck tension, muscle spasm *	X	
Brain fog	X	
Inconsistent or poor response to treatment for the neck	X	
Sleep disturbance, snoring, sleep apnea	X	

* S&S of lower cervical spine instability

Neurological Signs & Symptoms of Cervical Instability

	Com-mon	Diag-nostic
Report of seizure-like activity, diagnosis of 'non-epileptic seizures' or 'pseudo seizures'		X
Drop attacks not associated with dysautonomia (e.g., provoked by neck motion, or without dizziness common in POTS)		X
Lump in throat, choking, trouble swallowing, voice changes		X
Symptoms of dysautonomia (especially if not responding to standard treatment), persistent anxiety, functional GI dysfunction, poor temperature regulation, heat intolerance, presyncope	X	X
'Boat rocking' instability (not due to musculoskeletal issues)		X
Ataxia: Poor coordination (not due to joint instability) *		X
Facial tingling/numbness		X
Pulling sensation in face, head, teeth, tongue (muscle contraction, not just pain)		X
Vision changes- trouble with convergence, double vision, aura (teichopsia)		X
Dystonia: involuntary muscle contractions causing involuntary movements or postures *		X
Intermittent dysesthesias in the limbs, not associated with local issues *		X
Sleep disturbance, snoring, sleep apnea	X	
Cognitive changes		X

* S&S of lower cervical spine instability

Provoked by Neck Position or Movement

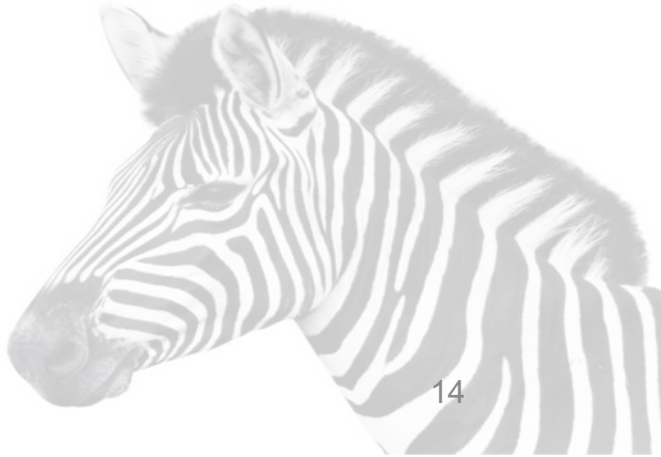
- Increased symptoms with neck motion into or when held in flexion, extension, and/or rotation; especially increased neurological symptoms
- Apprehension about neck extension (e.g., washing hair, going to the hairdresser)
- Increased symptoms when leaning forward, looking down, or forward head posture, e.g., using computer
- Increased symptoms when upright with neck unsupported
- Decreased symptoms when neck in neutral or wearing a neck brace
- Apprehension, anxiety, or fear of neck being touched

Signs & Symptoms Easily Flared (Irritable)

- **Condition is easily flared:**
  - Flares disproportionate to provocation. e.g., aggravated by minor movements, traveling in car/bus, unstable postures.
  - Fainting or seizure-like episodes from neck extension or rotation.
- **Prolonged time to calm after flare:**
  - Provoked UCI symptoms take excessive time to settle to pre-flare state:
    - e.g., >24 hours for pain or >several hours for neurological signs
  - Patient regularly needs to resort to wearing a cervical collar or bedrest to ease symptoms after a flare
  - Inability to tolerate being upright for >24 hours after flare

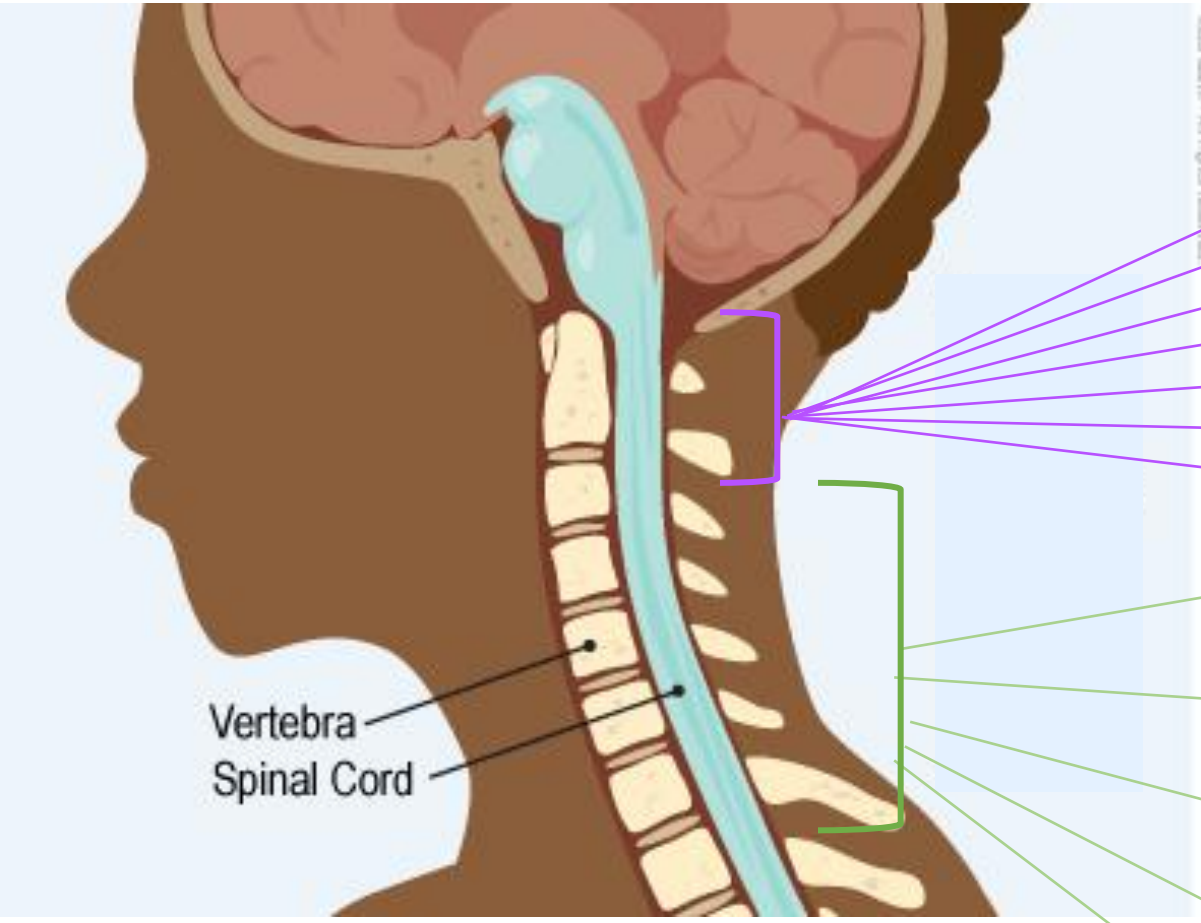
Indications That UCI May be Severe

- Poor tolerance to any time vertical
- Bed bound due to cervical symptoms
- Need to use a walker or wheelchair due to moderate or intermittently severe problems with coordination and balance rather than pain or weakness
- Extreme cervical spine guarding with fear of movement because severe symptoms are so easily provoked
- Choking episodes, trouble swallowing, voice changes
- Profound visual disturbances
- Severe nausea with any neck movement



Potential Sources of Problems

See Recorded Part 1 for anatomy and diagnostic testing



- Cord/brainstem compression
- Cranial nerve compression
- CSF blockage, Chiari
- Vertebral or carotid artery occlusion
- C1-C2 spinal nerves
- Joint capsules
- Trigger points and muscle spasm

Musculoskeletal
Vascular
CNS

(CFS=cerebrospinal fluid)

- Cord compression
- CSF blockage
- Spinal nerves C3-C8
- Joint capsule, meniscoids
- Trigger points and muscle spasm

HSD108: Headaches

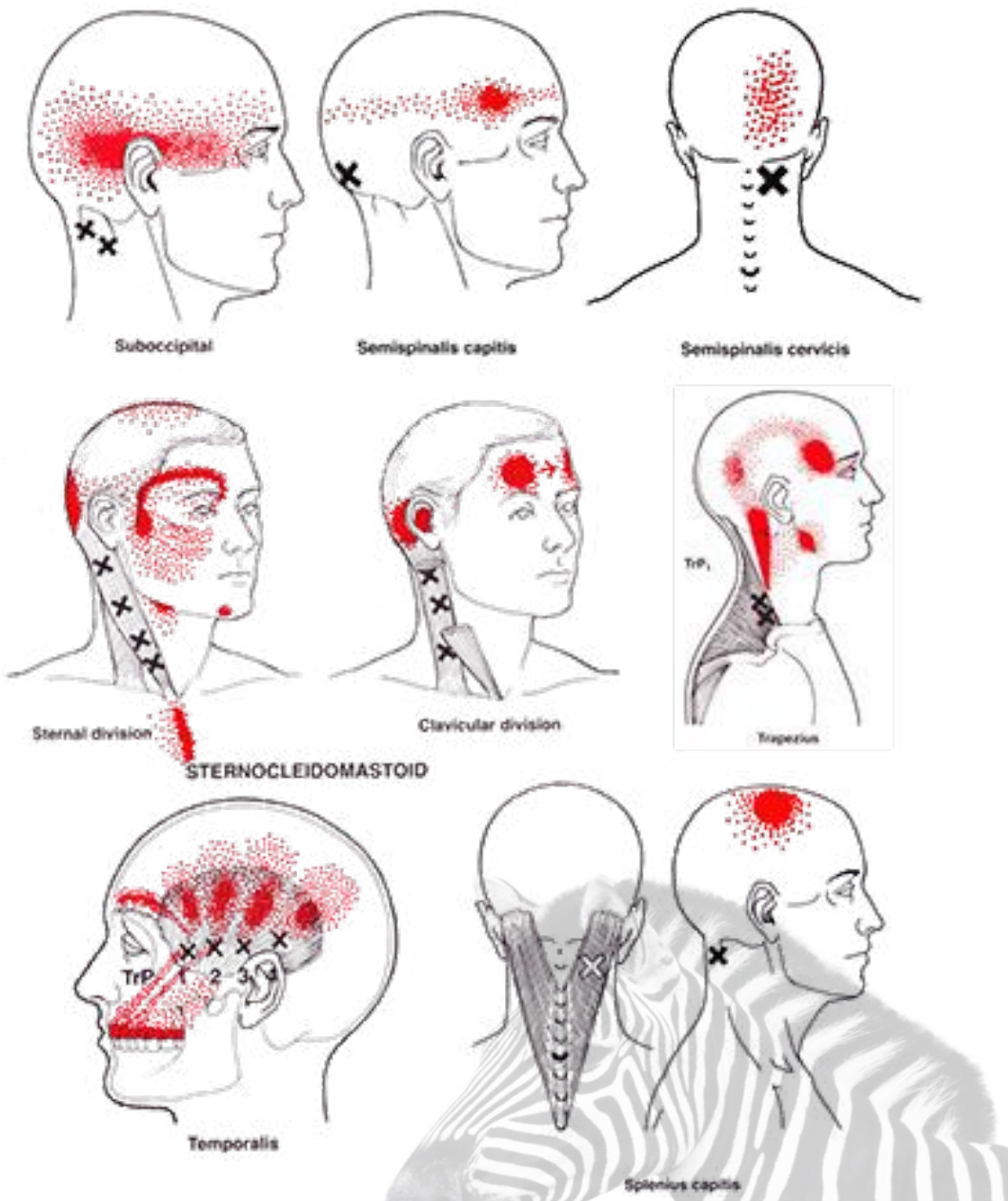
Trigger Points (TrP)

- Common in even mild cervical instability
- Created when superficial muscles are overworked because of:
  - Unstable joints
  - Poor posture (including sleep)
  - Poor body awareness (proprioception)
  - Weak/inactive deep neck stabilizing muscles

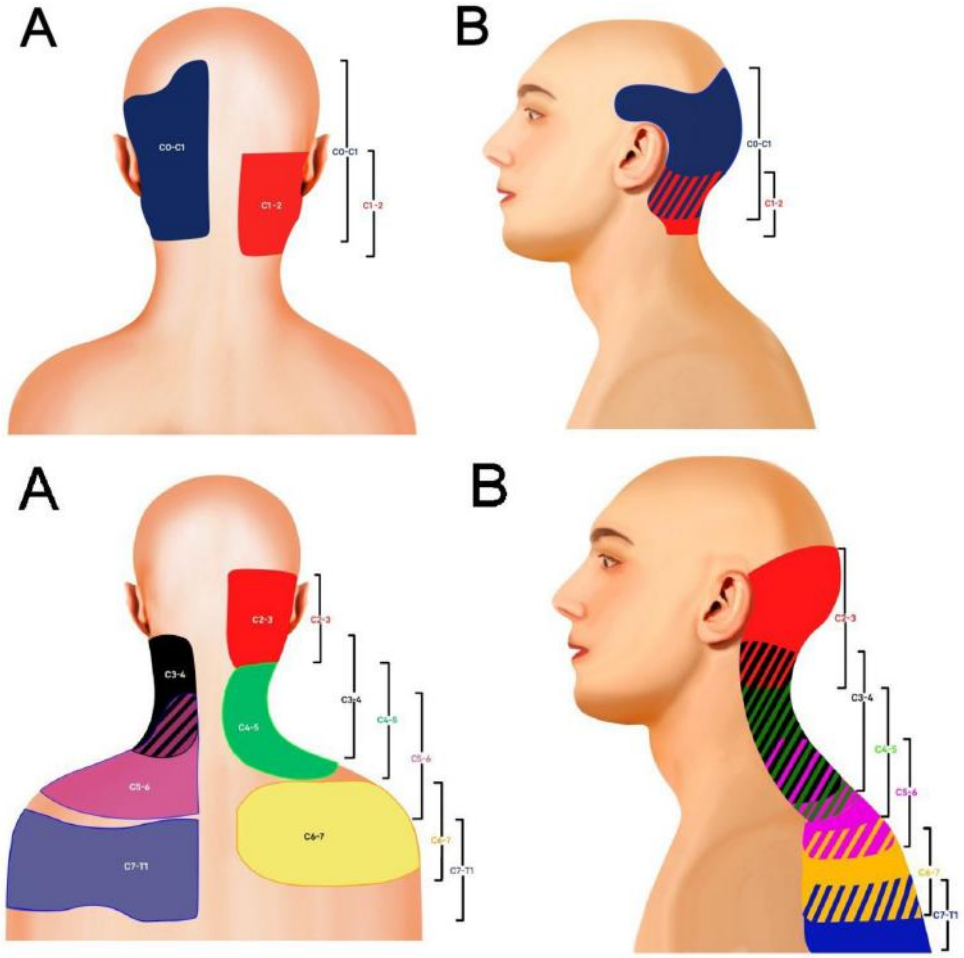
Resources on TrP:

Headache Trigger Points

- http://www.triggerpoints.net
- Valerie DeLaune, Pain Relief with Trigger Point Self-Help (2011)
- Valerie DeLaune, Trigger Point Therapy for Headache and Migraine: Your Self-Treatment Workbook for Pain Relief (2008)
- Richard Finn, Trigger Point Therapy Made Simple (2020)



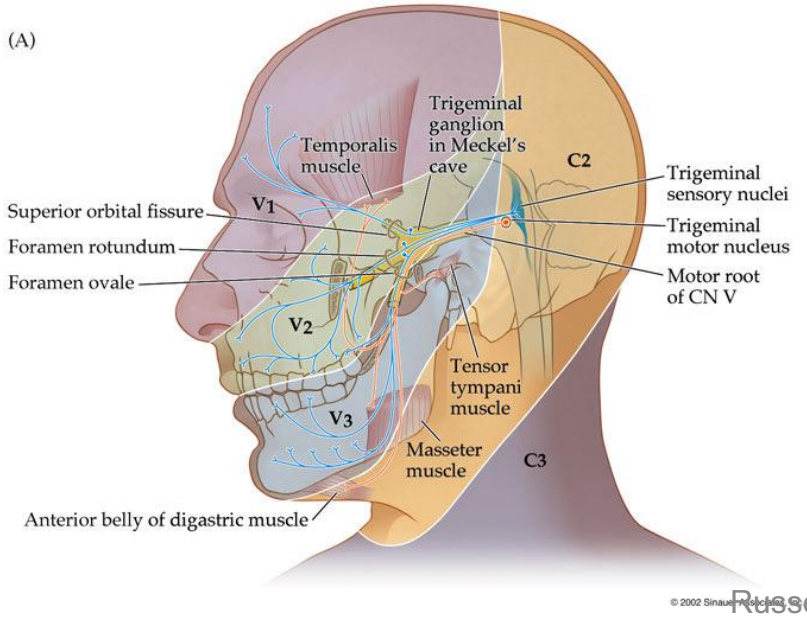
Joint Irritation or Subluxation

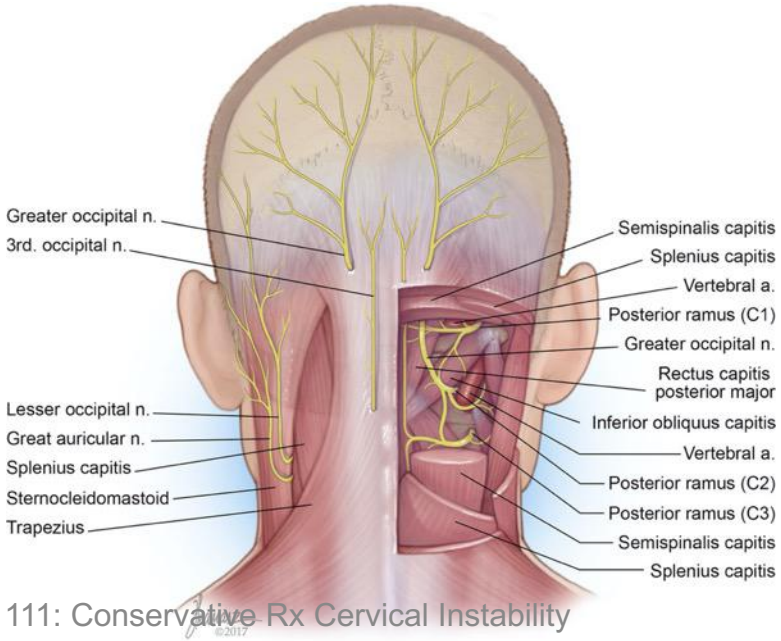


- Spinal joints may be irritated by poor posture, instability (due to poor body awareness & poor motor control)
- Aggravated by specific postures, movement, being upright, muscle spasm (due to instability, stress, etc)
- Often relieved by lying down, traction
  - (note: neck traction can be harmful for people with HSD, so only use if cleared by HSD-knowledgeable PT)
- Figures from Hurley, 2022

Peripheral Nerve-Related Headaches

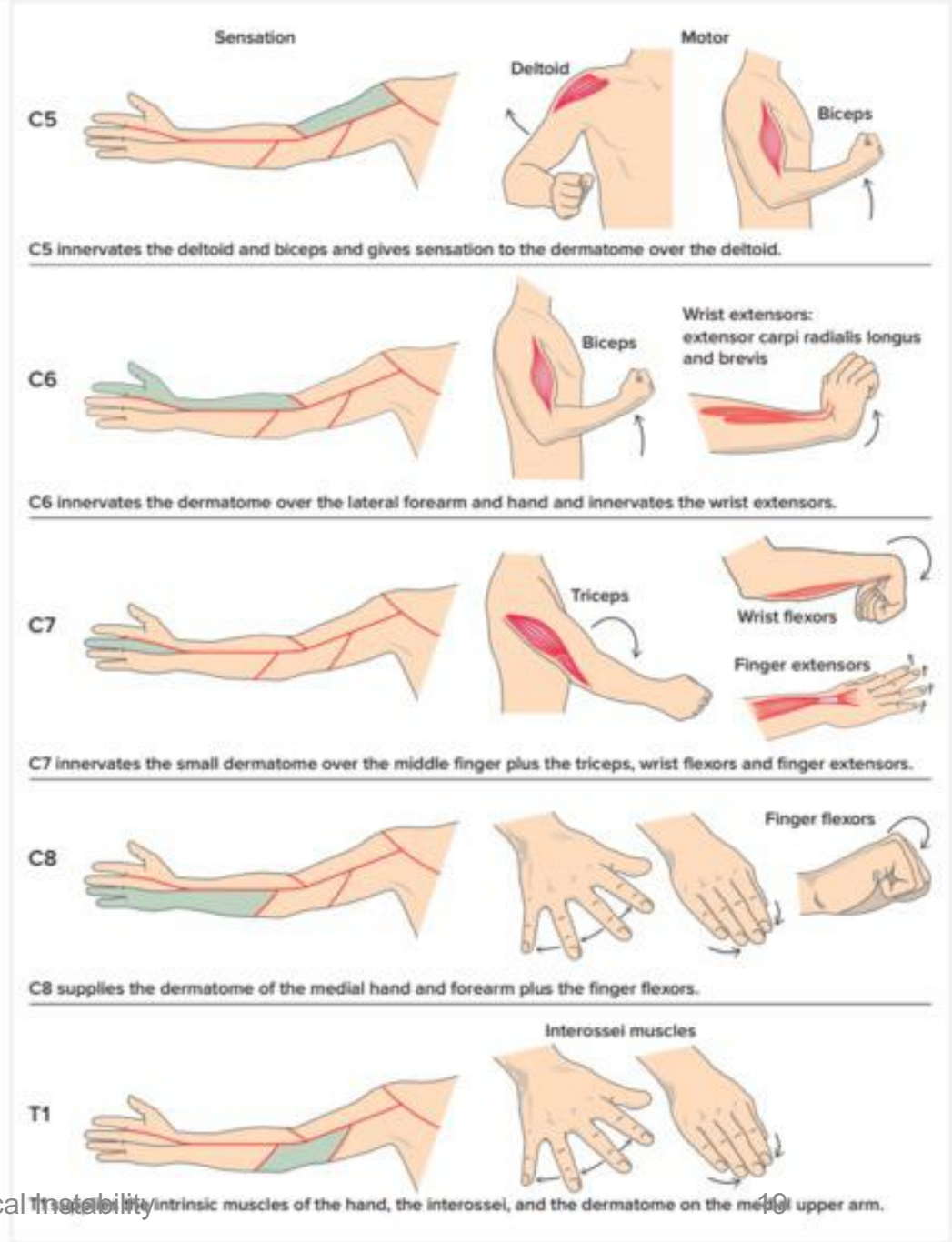
- In the back of the head, often called ‘occipital neuralgia’
  - Caused by compression of suboccipital nerve in neck fascia
  - Or compression of C1, C2, C3 nerve roots at the upper neck joints
    - Due to instability, poor posture, poor motor control
  - May cause headaches, neck pain, numbness, tingling in scalp
- In the face, may result in trigeminal neuralgia



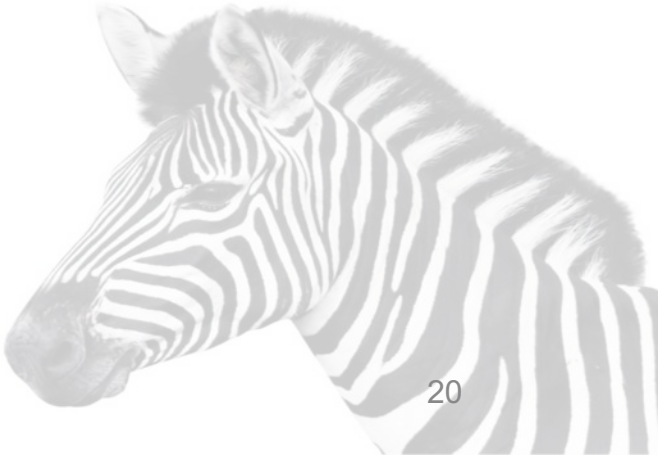


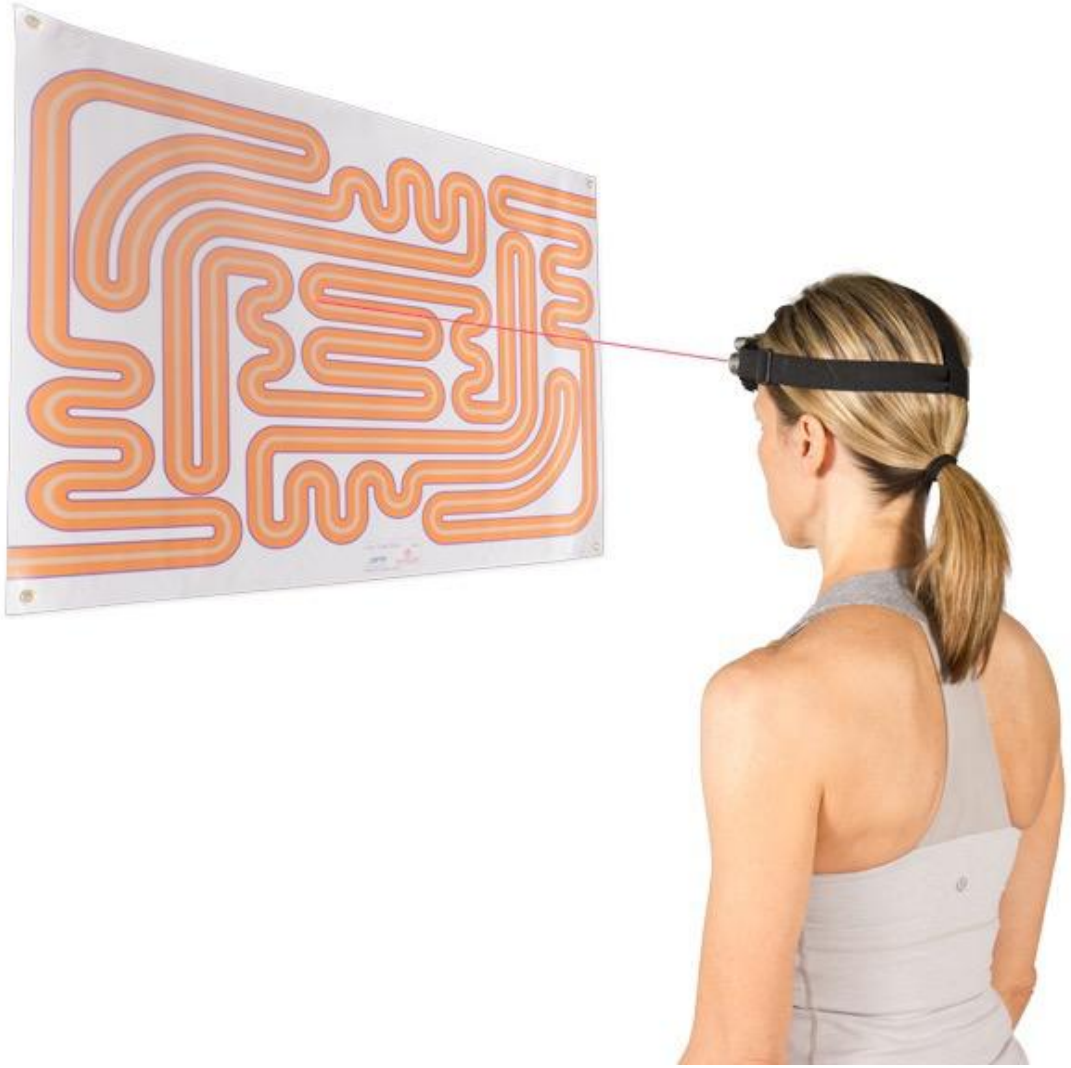
Lower Cervical Peripheral Nerves

- Instability in the lower cervical spine (C3-C7) can compress nerves
- Pain is typically ‘radicular’ – i.e., radiating down the arm
- May have numbness in specific regions, and weakness of specific muscles
- May be aggravated by poor posture
- May be relieved lying down, or by neck traction
  - (note: neck traction can be harmful for people with HSD, so only use if cleared by HSD-knowledgeable PT)



Questions?





Managing Cervical Instability

Approach to Management of HSD

HSD105: Body Mechanics

HSD103: Pain

Assist patient in identifying and managing systemic comorbidities: education, treatment and/or referral

Decrease central, peripheral, and autonomic pain sensitization

Educate for correct posture and joint alignment, body mechanics, joint protection, appropriate use of splints and braces

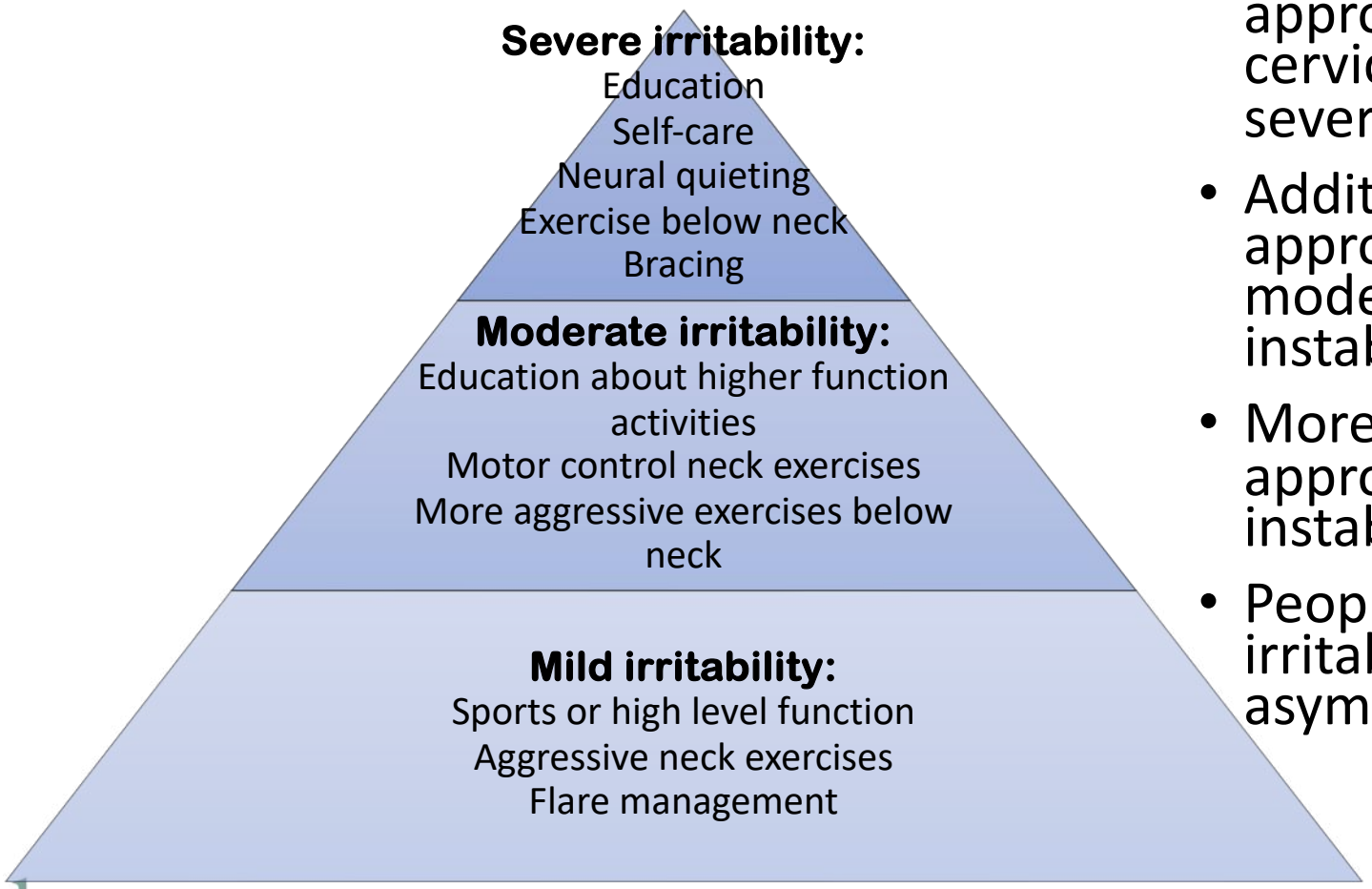
Proprioceptive and motor control training, with training to relax muscles that are guarding

Stabilization, strengthening, muscle flexibility, aerobic conditioning

Integration of proper alignment & movement into function

Education about flare management

Tiered Management of UCI



- Some interventions are probably appropriate for EVERYONE with cervical instability, even people with severe and irritable instability
- Additional interventions are appropriate for most people with moderately severe and irritable instability
- More aggressive interventions are appropriate for people with mild instability
- People hopefully progress from most irritable to least irritable then to being asymptomatic

Treatment for Severe Instability

- PT may STILL be beneficial while waiting for neurosurgical consult.
- Education about self-care:
  - Postural training sitting, standing, sleeping; use of body supports
  - Body mechanics, functional training, pain management
  - Creating a pain self-management 'tool-box' such as TENS, topicals, heat, ice…
- Management of issues remote from the cervical spine may be safe:
  - Cautious core training for lumbar spine, pelvic floor, diaphragmatic breathing (e.g., exercises supine with neck supported).
- Education about neck bracing and precautions:
  - Educate patients about informing other health care providers regarding cervical instability, e.g., wearing cervical collar during shoulder surgery.

Patient Education: General

- Correct spine and lower extremity posture.
  - Neutral spine in supported and unsupported sitting (no forward head).
  - Decrease excessive lumbar arch and forward tipped pelvis.
  - Unlock knees in standing.
- Use orthotics and LE bracing as needed.
  - Relative to activity demands – bed-bound vs. work.
- Body mechanics, functional ergonomics, joint protection.
  - Adapting daily activities, such as sleep, driving/riding, cell-phone, tablet, computer, work activities.
- Pain neuroscience education.
- Autonomic nervous system calming strategies
  - Physiological quieting exercises, manual therapy, self-care "toolbox".
  - Diaphragmatic and/or slow breathing, vagus nerve exercises.
- Fatigue & activity management.

HSD105: Posture & Joint Protection

Posture

Joint Protection

HSD103: Pain

Curable app

HSD109: Breathing
HSD112: Vagus nerve

Breathing

How to Start Exercising

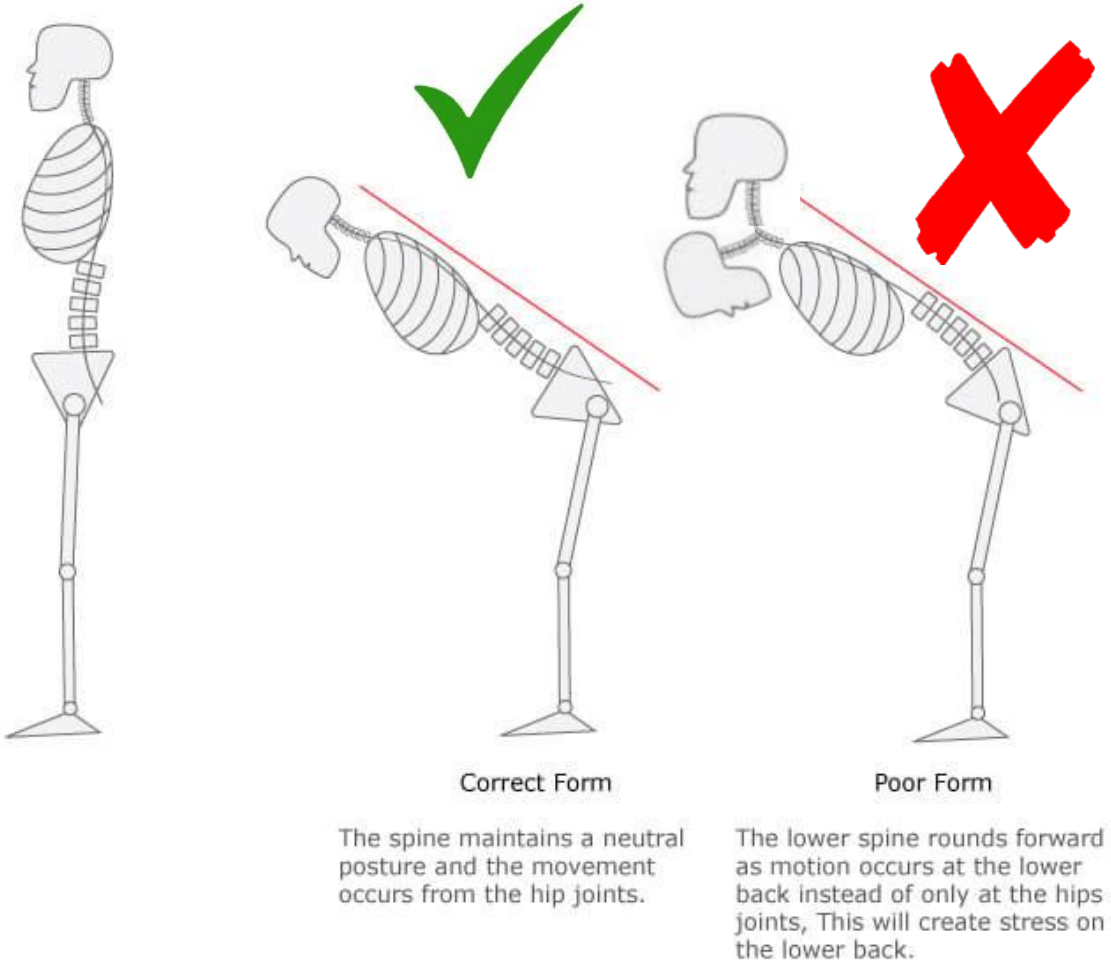
Functional Training for UCI: 1

- Keep good neck alignment during functional activities, such as cleaning teeth, reaching at the table, leaning forward for eating foods, etc. Use hard collar to limit neck movement if needed.
- Lie down to put in contact lenses to avoid poking head forward.
- Log roll in bed to avoid twisting neck.
- Looking straight into the mirror for positional cueing: hair brushing, drying with blow dryer. Never bend into flexion/extension/side/rotate to dry hair. Hard cervical collar to prevent neck movement.
- Using electronics: side-lying, support to hold devices, hold phones at eye level, don’t looking down.

Functional Training for UCI: 2

- Belly button rule: Face people you are talking with or directions you need to look. Your nose needs to stay in alignment with the belly button; turn your feet or body to keep alignment.
- Toileting: Avoid straining, use squatty potty, long reacher for perineal care to avoid twisting.
- Dressing: Use a dressing stick to put on shirts, lie down for pants & socks, slip on shoes or elastic shoelaces, long shoehorn, etc.
- Sexual activity: Person who has instability should be on the bottom position. The person without instability should be the more active partner. Clearance from MD is recommended.

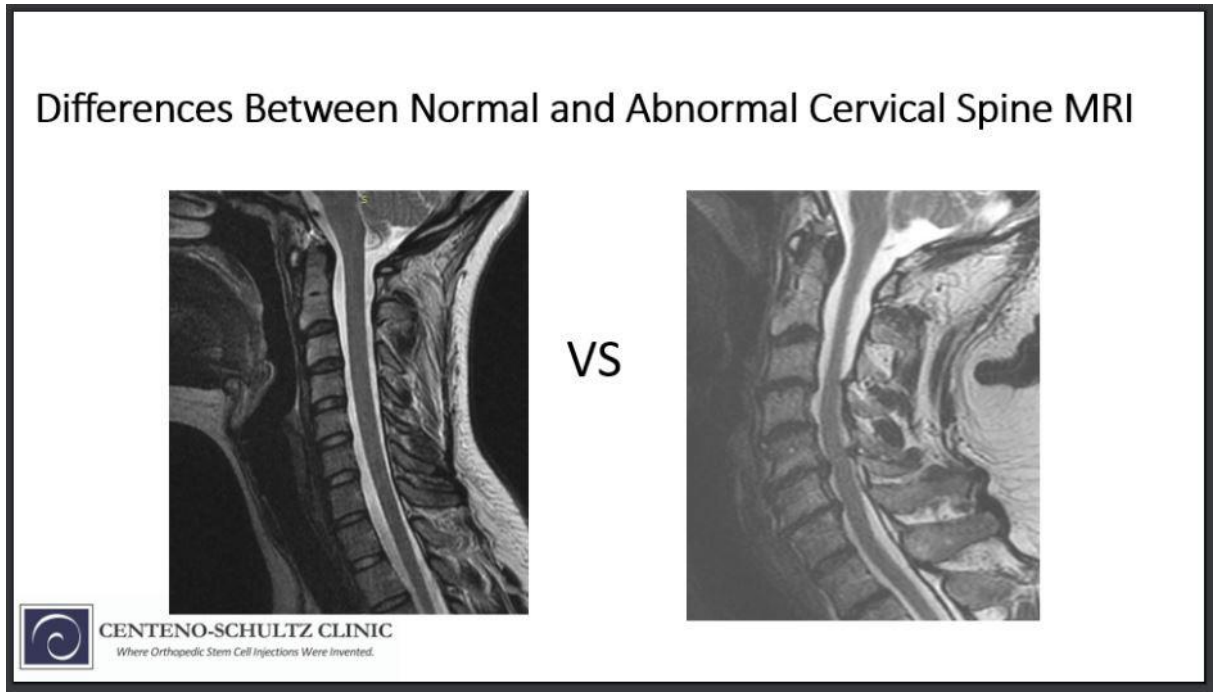
Example of Good Body Mechanics



https://www.endurancephysio.net/news/2017/11/10/movement-mechanice-matter-exercise-highlight-hip-hinge

- Keep the neck aligned with the spine
- If you need to bend forward, use a ‘hip hinge’
- Don’t tip head forward or backward relative to the shoulders

Optimize Posture!



https://centenoschultz.com/differences-between-a-normal-vs-abnormal-cervical-spine-mri/

https://www.linkedin.com/pulse/what-forward-head-posture-benefits-correcting-tae-kim
X-rays over time of a patient treated for forward head. Time frame not reported.

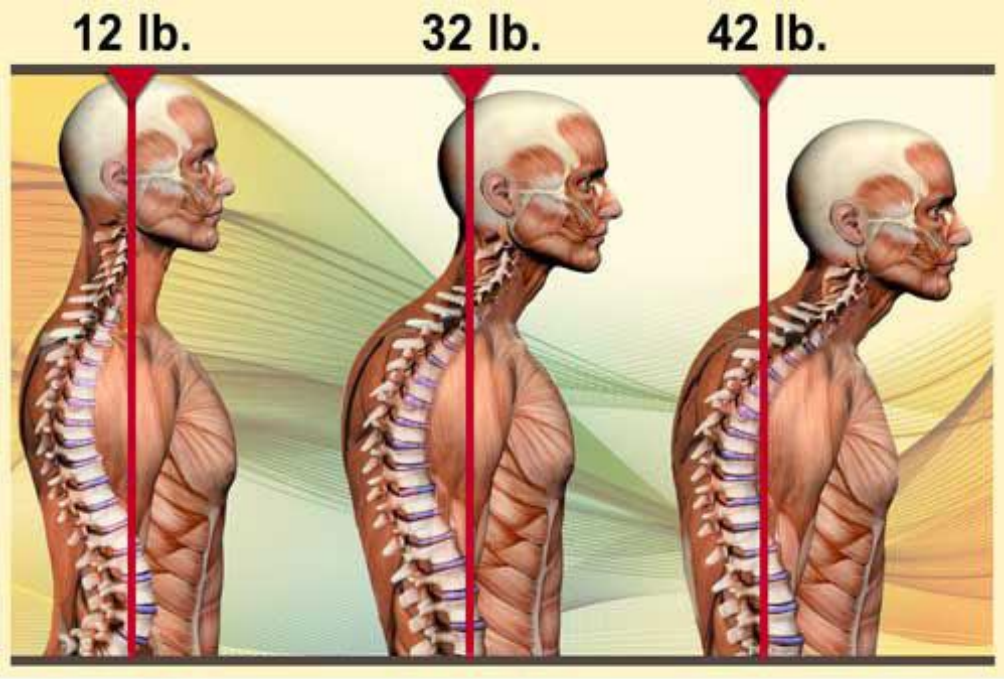
- Improve neck alignment as much as possible, as early as possible
- Forward head can compress the spinal cord, spinal nerves, medulla, carotid arteries and internal jugular veins
- Rotating your head when in forward head posture can compress the vertebral arteries

Posture

HSD105: Posture & Joint Protection

Posture

- Poor posture stresses:
  - Joints
  - Muscles
  - Peripheral nerves
  - Spinal cord/brain structures



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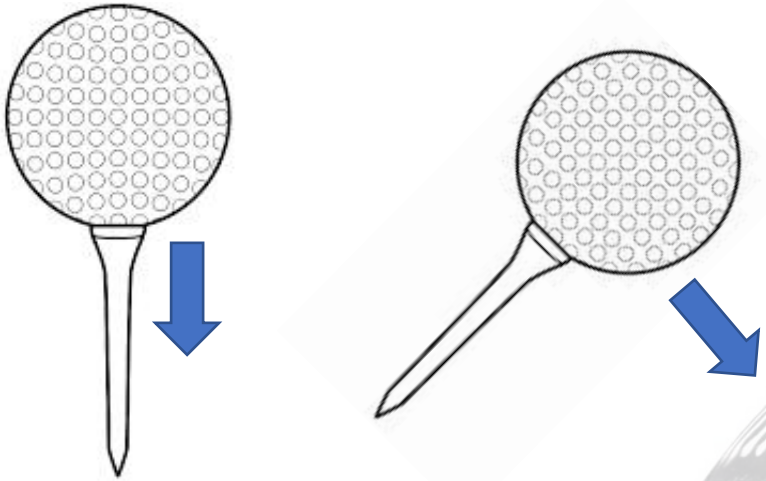


Good Posture

Bad Posture

HSD105: Posture & Joint Protection

Correct Posture

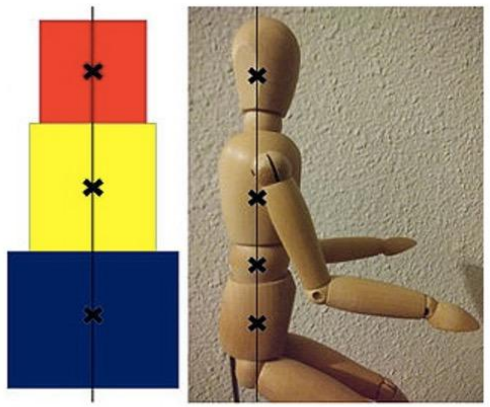


Figure 1. Stacked, aligned posture

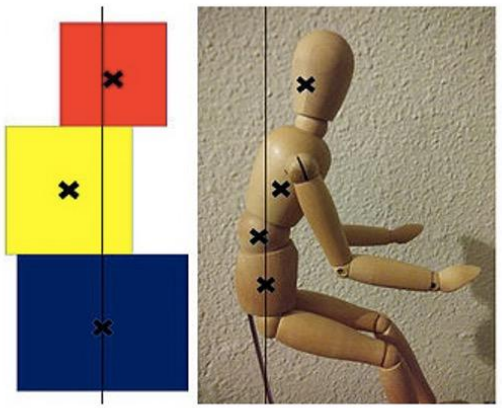
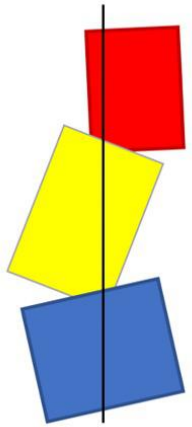
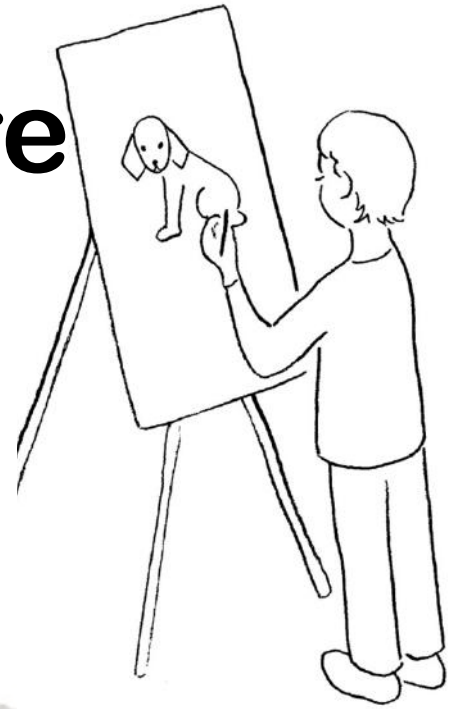


Figure 2. Postural misalignment



- Correct full body posture
  - Self-awareness, biofeedback
  - Posture supports
  - Pillows and positioning for sleep
  - Proper ergonomics
    - Devices to allow better posture
- Improve body awareness & proprioception
- Improve motor control
- Strengthen postural muscles, including upper back

Other Gadgets to Improve Posture



Mirror glasses

"Upright" posture biofeedback;
https://www.uprightpose.com

https://www.lowes.com/pd/Uncaged-Ergonomics-Adjustable-Height-Reading-Stand/

https://alignmed.com
Posture clothing

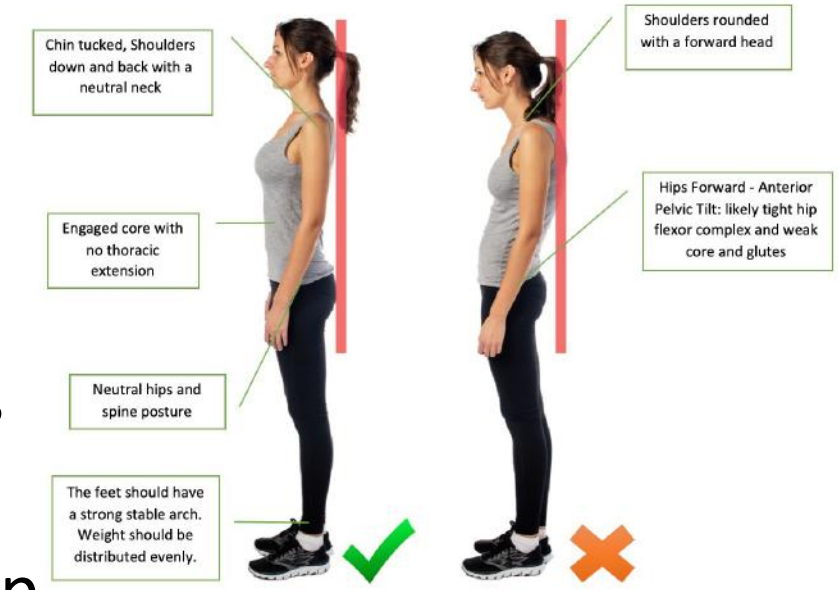
Neck Braces

- There is no research showing whether neck braces are helpful or how they should be used.
- However, all EDS cervical instability experts feel they can be important for moderate-severe instability
- The following is based on expert opinion.
- Brace options:
  - Thuasne Eclipse Collar – adjustable, solid chin rest.
  - Aspen Vista for more support. (with or without thoracic extension)
  - Aspen Vista or Miami J for a long-necked patient, or for short wide neck.

Neck Braces

- How much should the neck brace be worn?
- Unknown – there are multiple different views on how to use.
  - Use for 10-15 min when you feel bobble-headed or when traveling. But don't wear more than 10-15 minutes other than travel.
  - Up to 4 hrs/day.
  - Okay to wear neck brace at/all night if patients tolerate it.
  - Dr. Henderson recommends wearing the cervical brace 24/7 for several weeks to allow irritated tissues to calm down. With isometric strengthening. But he may see more involved patients on path to surgery.
- You should probably maintain strength when wearing a collar by doing isometrics in the collar, 5 min, several times a day.

Full Body Motor Control

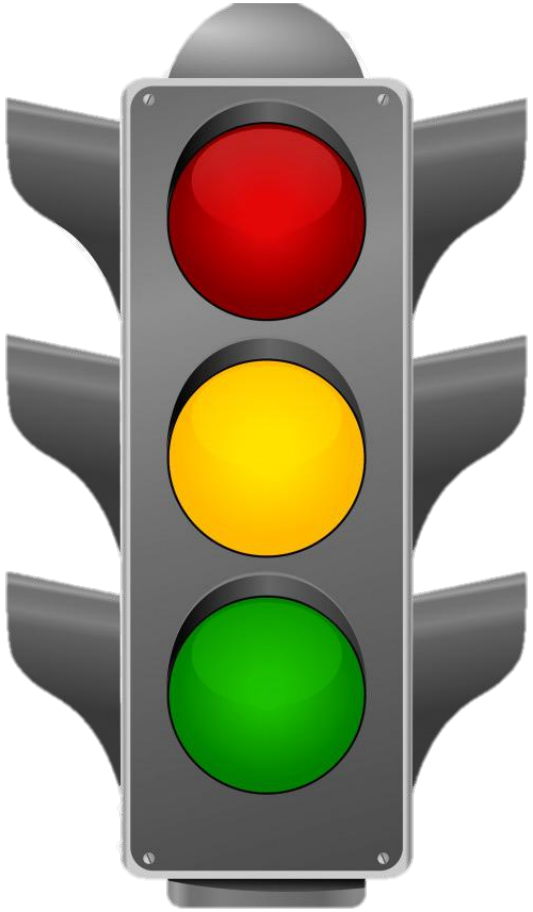


- Stabilize the base upon which the neck functions
  - Stabilize hips, low back, shoulders
- Correct any alignment problems, from the foot up
  - E.g., foot orthotics, hip strength, pelvic alignment, low back stability, etc.
- Learn to walk more smoothly, with less rotation and side-to-side sway.
  - May need to fix knee hyperextension or foot pronation (flat foot).
  - Exercise examples:
    - Walking in front of mirror for symmetry and alignment
    - Using head laser when walking, try to keep laser on target

“Pull Yourself Together”

- People with HSD are like these push toys with the tension released (bottom picture)
- We need to “Pull ourselves together” so the joints are held in better alignment (top picture)
- This creates a slight, healthy stiffness in the joints (not rigid tension)

"Ready, Set, Go"



- Planning and preparation can protect your body
- "Ready": Correct your posture and alignment so you are ready to move.
- "Set": Activate your stabilizing muscles so they are set to stabilize joints.
- "Go": Now, go ahead and move!

Management of Moderate Irritability

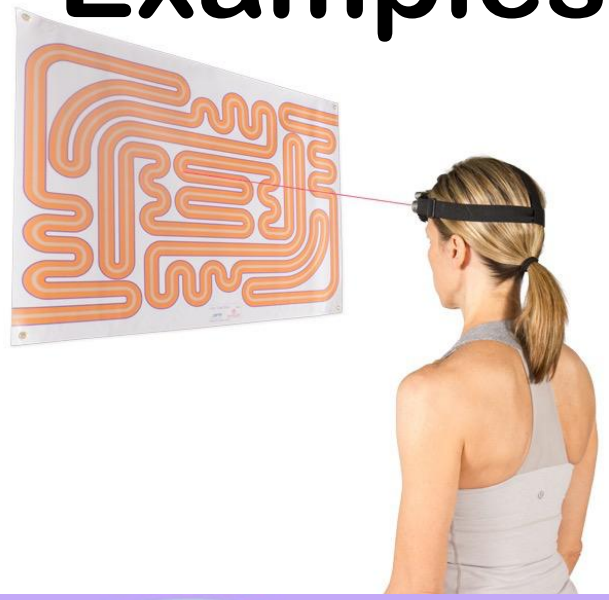
- Education and posture as noted, above
- Proprioception and motor control training, often starting away from cervical spine (e.g., lumbar, thoracic, pelvic floor, hip)
- Neck brace might be appropriate for some people. Use as needed.
- Advanced manual therapy techniques – *only if PT properly trained*
  - Soft tissue therapy
  - Dry needling may be helpful for muscles in spasm, especially UT and occiput
  - Do NOT allow your neck to be manipulated ("cracked"). While there are chiropractors who can do this safely, there are risks associated with it
- Note: although patients may feel better with neck traction, traction is not considered a safe treatment for people with cervical instability.

Neck Proprioception Training

- Visual: Look in a mirror (e.g., to make sure shoulder are back)
- Use a head-mounted laser pointer
  - Motion Guidance™ (e.g.: https://youtu.be/SggmqmZhmDU) or SenMoCOR™
  - Lalomo Rechargeable LED Headlamp, Super Bright Head lamp Headlight Flashlight with Laser ($25)
- Use biofeedback such as pressure biofeedback (e.g.: https://youtu.be/mRyev39P0ZI)
  - Stabilizer™ not available. Use Core Coach™
- Virtual reality: e.g., XR Health (https://www.xr.health)

Top Picture: https://www.researchgate.net/publication/317916945_Influen_of_Cervical_Spine_Manipulation_on_Neck_Joint_Position_S nse_error_in_patients_with_chronic_neck_pain/figures?lo=

Examples of Motor Control Exercises



- Laser stabilization with arm movement
- Laser tracking
- Virtual reality e.g., XR Health (https://www.xr.health)
- Tactile feedback (touching muscles to see if they contract or relax
- Motor control training of lumbar spine helps the cervical spine (Khosrokiani, 2022)

Example of Laser Training Progression

- If being upright provokes symptoms, start lying on your back
  - Target the laser at a point on the ceiling, keeping the laser on target while you:
    - Work on breathing,
    - Clasp hands together and lift towards the ceiling,
    - Lift one hand at a time, towards the ceiling or out to the side (angel wings)
    - Do alternate knee mini-marches (unweight one leg, then lower)
  - Do very small range neck motions with laser on the ceiling: up/down and side/side
    - No more than a subtle nod ‘no’ or ‘yes’
- Progress to (or start with) sitting
  - With back support: breathing, both arm movement, single arm movement
  - Repeat arm movements without back support
  - Do sitting march
  - Do small vertical and horizontal lines with the laser (‘no’ and ‘yes’ nods)
  - Trace a maze/picture outline, continuing to limit to small neck movements.

Motor Control Before Strengthening

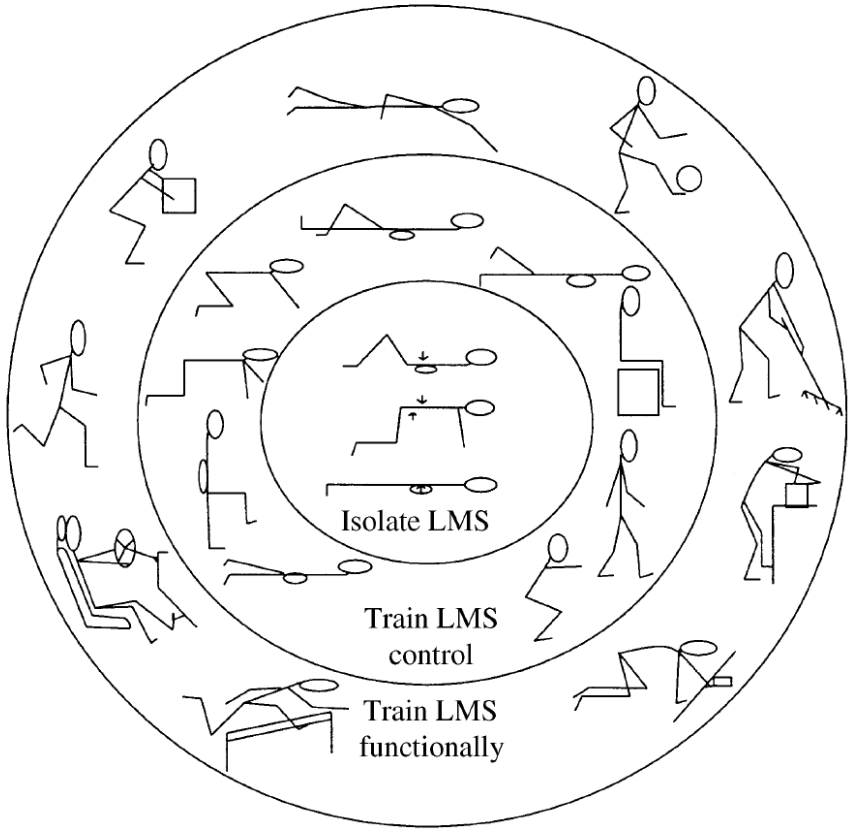


Fig. 12—Stages of rehabilitation based on a motor learning model (LMS – local muscle system). (Reproduced by kind permission of W.B. Saunders.)

- Motor control is about using the correct muscle, at the correct time, and the correct intensity
- Stabilizing muscles often 'shut down' when there is pain, and they often don't come back
- Start by isolating stabilizing muscles
- Then teach them to control movement
- Finally integrate into function

O'Sullivan, 2000

Management of Mild Instability

- **Strengthening** (if still symptomatic, start at low back or shoulder)
  - Low back and core: transverse abdominal activation with breathing progressing to core activation and stabilization with lower extremity movement progressing to upright/functional movement
  - Pelvic floor strengthening may be helpful as part of the full core stabilization.
  - Shoulder girdle (shoulder blade and shoulder):
    - e.g. "goal post" shown here
    - (https://www.yerongachiropractic.com.au/poke-neck/ash-posture-exercises/)

- **Manual therapy** for muscles in spasm
  - Typically cervical paraspinals, sternocleidomastoid (SCM) upper trapezius, pectorals, jaw.
  - It may also be helpful to address problems in the hips, low back, etc.

Management of Mild Instability

- **Strengthening** of neck and upper back (Celenay, 2016)
  - Cervical isometrics (static contractions)
  - Quadruped reaching, if the neck is strong enough.
  - High level patients (e.g. returning to impact sports): Dynamic cervical resistance bands, rhythmic stabilization (pressure applied to the head while the patient maintains good alignment).
- **Focused stretching/lengthening** of muscles, protecting associated joints
  - Inhibit upper traps, if overactive. Strengthen/activate upper traps if overstretched.
  - Stretch pectoral (chest) muscles, if short
- **Functional training exercises** to protect the neck system during return to activity/work
  - E.g., how to lift or bend forward while maintaining good neck alignment

Exercises That Might Be Too Difficult

- **Only do exercises that are appropriate for your current fitness level.**
- **Some of these exercises may be too difficult for you.**
- Some people may be able to progress to this level of challenge, while others should not.

Celenay, 2016

When To Refer To Neurologist/Neurosurgeon

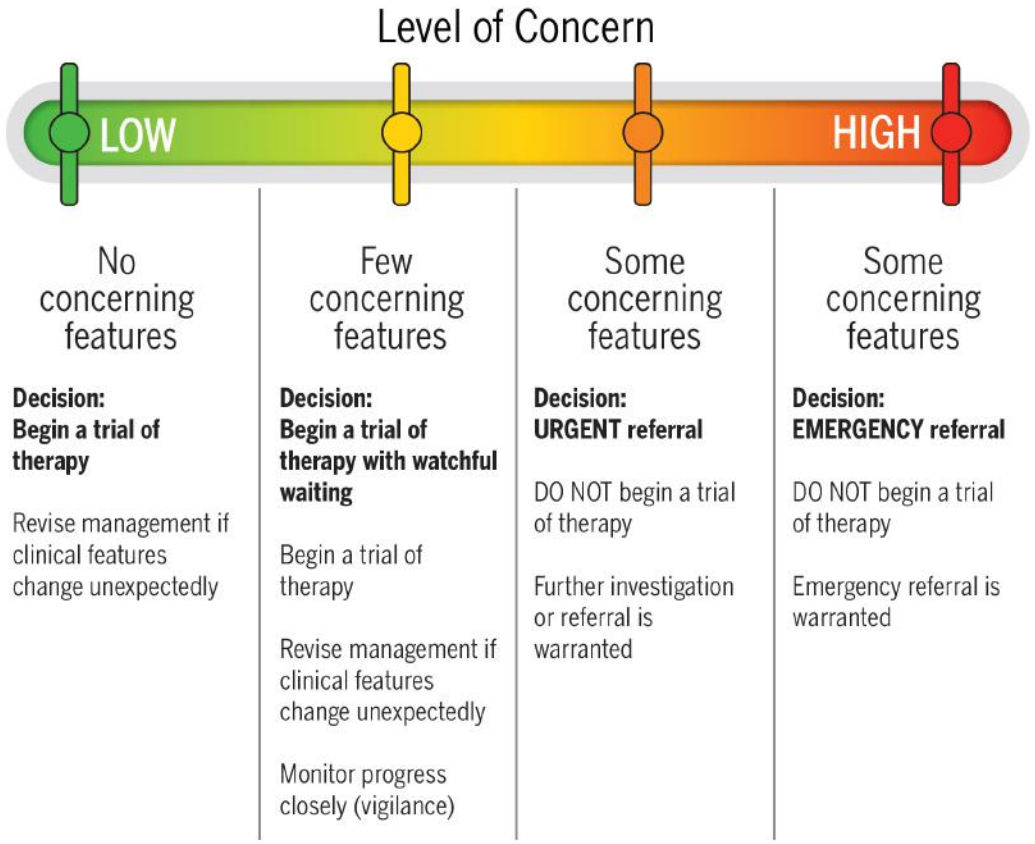


FIGURE 2. Decision tool for early identification of potential serious spinal pathology, step 2. Decide your clinical action based on your level of concern.

(Finucane, 2020)

When To Refer To Neurosurgeon

- Do not refer/"no concerning features”:
  - It is primarily musculoskeletal
  - Neurological signs, if present, are mild and/or intermittent
  - Signs and symptoms are fairly stable (i.e., not worsening quickly)
- Watchful waiting with PT/“few concerning features”:
  - Some neurological signs, but only a few, not severe, or intermittent
  - It is fairly stable (i.e., not worsening quickly)
  - Monitor for increased number, severity, or consistency of neurological signs
  - Pain, while certainly bothersome, is not a ‘concerning feature’

When To Refer

- Red flags, ”concerning features” and send for neurosurgeon consult. Patient is not appropriate for exercise or manual therapy directly to the cervical spine.
  - Increase in abnormal neurological reflexes or bulbar signs: clonus, Hoffman’s, Babinski, seizures or loss of consciousness (not due to POTS).
  - Traumatic history.
  - Rapidly progressing.
  - Unable to stand or walk due to neurological issues (not peripheral joint/muscle issues or pain)
- PT may STILL be beneficial for postural training, body mechanics, safe core training for lumbar spine
- Testing required by neurosurgeons for referral for possible fusion:
  - Cervical traction trial (Bolognese)
  - Upright MRI (Henderson)

How Professional Guidance Can Help

A physical therapist (or other movement specialist) can:

- Help you learn to recognize correct neck alignment
- Make sure you are activating the correct stabilizing muscles, and not activating the global muscles
- Help you learn to recognize correct movement
- Identify appropriate exercises
  - Not all exercises are good for cervical instability
- Make sure you are doing appropriate exercises for your fitness level
- Make sure you progress exercises appropriately (not too fast)
- Help you apply stabilization skills to functional activities

In Summary…

- Cervical instability may impact many different structures, which can lead to a variety of confusing signs & symptoms.
  - Part 1 of this lecture discusses anatomy, pathology, diagnosis
  - Conservative care is generally similar, whatever structures are affected
- Cervical instability is about neuromuscular control, which **you can change**.
  - Loose joints do not mean instability is inevitable!
  - You can learn body awareness (proprioception); external feedback can help
  - You can learn to re-activate stabilizing muscles, but it is often difficult!
  - It is very important that you do exercises correctly.
    - The exercises need to be appropriate for you, & you need to be using the correct muscles

Resources

- Ehlers-Danlos Society
  - https://www.ehlers-danlos.com/2017-eds-classification-non-experts/ For non-experts
  - https://www.ehlers-danlos.com/2017-eds-international-classification/ (technical)
- Awesome booklet: EDS cervical instability by EDSawareness.
- The following site has useful information about cervical instability. The site recommends prolotherapy (injections). I can neither support nor criticize prolotherapy. But the site has a lot of good information. https://www.caringmedical.com/conditions/prolotherapy-neck-pain-cervical-instability/
- Neurosurgical EDS specialist MDs
  - Dr. Fraser Henderson (Baltimore, MD): https://www.metropolitanneurosurgery.org/dr-fraser-henderson/
  - Dr. Paulo Bolognese (NYC, NY): https://www.southnassau.org/sn/chiari-eds?srcaud=Main
    - Informative YouTube: https://youtu.be/MsYDA3SXTkg
  - Dr. Sunil Patel (Charleston, SC): https://musc.bcst.md/participant/sunil-patel-m-d
- PTs who specialize in cervical instability
  - Susan Chalela: (Charleston, NC, does telemedicine): https://chalelapti.com
  - Wendy Wagner (Chicago, IL): www.wendy4therapy.com
  - Patricia Stott (Aurora, CO): www.elevationwellness.co
  - Heather Purdin (Portland, OR): https://goodhealthphysicaltherapy.com

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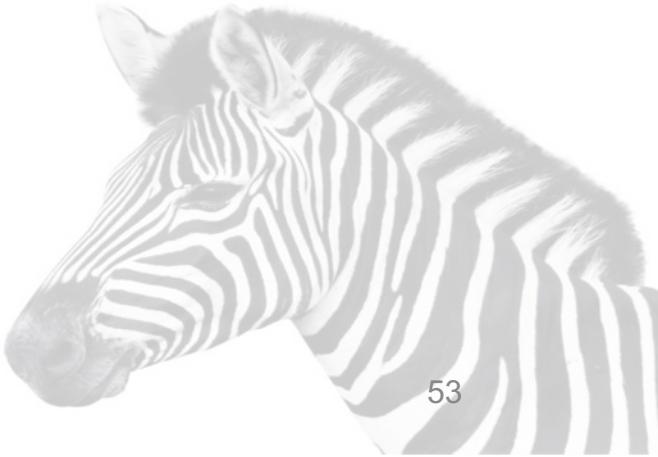
Thank You!



Questions?