Full-Spine Analysis & Adjustive Technique
Females Only
Madison, WI
March 12-13, 2016
www.motionpalpation.org

Note:
- Photo taking, video or audio recording is not permitted during MPI programs.
- Please keep your cell phone turned off during the program.
- The PowerPoint notes file(s) cannot be provided.

Thank you.

All materials presented are for educational purposes only.
- Diagnosis and treatment methods may be discussed and/or demonstrated but will in no way constitute the delivery of any form of management or the development of doctor-patient relationships.
- All registrants assume personal responsibility for their personal safety and welfare while participating in MPI programs and for the extent of their participation.
- The program notes are purposely not complete – the remainder of the information is presented in the program & in specified journal articles and references.

Vision & Agenda
1. To provide classes that help develop and refine the palpation and manual skills of DC’s & DC’s in training to a level that is unmatched and unparalleled.
2. To provide classes that integrate the majority of manual therapy and rehabilitation techniques in a chiropractic friendly way to help the practitioner achieve clinical and financial success.
3. To deliver these classes with character, humility, humor and compassion.

Sarah Macchi, DC
Private Practice:
Mission Health Clinic
Calgary, Alberta
Active Edge Chiropractic
Canmore, Alberta
smacchi22@hotmail.com

This PROGRAM will provide:
- A review of the Chiropractic “lesion”
- Biomechanics of the involved areas
- Motion palpation analysis & joint play procedures of the relevant areas
- General concepts of adjustive procedures
- Biomechanically correct methods of adjusting specified joint restrictions
- Integrated treatment approach

Full-Spine Analysis & Adjustive Technique
<table>
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<tr>
<th>Evolution of the Motion Palpation Institute</th>
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<tr>
<td>Henri Gillet, D.C.</td>
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<td>• Started working with movements of the joints as opposed to x-ray analysis due to legal restrictions on imaging in Belgium.</td>
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<td>Leonard John Faye, D.C.</td>
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<td>• Met Gillet in 1962 and began studying under him.</td>
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<td>• Explored some of the scientific rationale behind the movement of joints and the impact on health.</td>
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<td>• Brought Motion Palpation to the United States and Canada.</td>
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<td>• With help from Henri Gillet, Fred Illi, Ray Sandoz, and Adrian Grice, L.J. Faye began to create a shift in the field of chiropractic, moving the profession into a rational, scientific approach towards health.</td>
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<td>Karel Lewit, M.D. D.Sc.</td>
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<td>• Explored the concept of a joint restriction creating compensatory problems within the locomotor system.</td>
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<td>Vladimir Janda, M.D. D.Sc.</td>
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<td>• Neurologist who worked with Lewit, emphasizing the importance of man’s predisposition to muscle imbalance syndromes.</td>
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<td>• Contended that these muscle imbalance syndromes promote and perpetuate joint dysfunction.</td>
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<td>The work of many other physicians and scientists has been incorporated into the evolution of the Motion Palpation Institute. To name a few:</td>
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<td>• McGill</td>
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<td>• Vleeming</td>
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<td>• Waddell</td>
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<td>• Seaman</td>
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<td>• Mennel</td>
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<tr>
<td>• Hammer</td>
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<td>• Kolar, Vojta...</td>
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The Chiropractic Lesion...what it isn't...

- Subluxation/Misalignment – is it possible...and if it is, can we actually palpate it...and if we can, can we affect it...and if we can, how do we measure it...and, and, and?
  a. Down's Syndrome
  b. Rheumatoid Arthritis
  c. Spondylolisthesis
  d. Severe Degenerative Changes
  e. True Dislocation – Shoulder

The Chiropractic Lesion...what it isn't...

The term subluxation or misalignment & the lesion that is represented by these terms rely on a few principles that have a very questionable scientific basis:

- Symmetry of Bone – See Marc Gottlieb, JMPT, Atlas Asymmetry (normal anatomical variation)
- Static Films can't be measured accurately – Literature Review by Brantingham & Dishmann – 5mm marking error with each line marking // Spine Volume 23, Number 10, pp.1114-1119 – Manipulation does not alter the position of the SI Joint

The Chiropractic Lesion...what it is...

- Joint Restriction/Fixation/Dysfunction
  - Muscle, ligament, joint capsule.
- Directional Instability
  - a postural change that results in restriction of movement in various planes depending on spinal location
- Postural/Movement Dysfunction

The Chiropractic Lesion...what it is...

Postural/Movement Dysfunction:
1. Causes/Caused by:
   a. Capsular & Ligamentous Changes following trauma & the inflammatory cascade — Clinical Orthopedics, 1987, Akeson, Amiel, Abel, Garfin & Woo (for an overview see the Aging Body by Morganthau & Boughie) – Chapter 5
   c. Muscle Imbalances – Janda
   d. Alterations in the Arthrokinetic Reflex – Cassidy / Mooney
The Chiropractic Lesion...what it is...

Alterations in the Arthrokinetic Reflex – Cassidy / Mooney
- Based on Hilton’s law, the nerves that innervate a joint innervate the muscles around the joint. If there’s a problem within the joint the surrounding muscles will be weakened, or shut off. This has been proposed as a primary mechanism of dysfunction in all areas of the spine.

1.) SIJ dysfunction and glute inhibition, (Bernard and Cassidy 91)
2.) Lumbar joint dysfunction and multifidus inhibition, (Hides 96)
3.) Cervical spine and L.coli inhibition, (Wright, Jull 2001)
4.) Vastus medialis inhibition after knee joint dysfunction, (Richardson PhD thesis)

ANKLE INSTABILITY (COBBIE ET AL. 1994)
KNEE SPRAINS (LETTERTHOM ET AL. 1995)
KNEE OA (BERRIN ET AL. 1992)
LOW BACK PAIN (JACKSON & JAFFEE 1980)
CERVICAL PAIN (MARKBERG ET AL. 1983)
AGING PROCESS (Woolacott, 1986)

REFLEX LOOP BETWEEN JOINT MECHANORECEPTORS & MUSCLES SURROUNDING A JOINT (Guanche, ETAL. 1995).

Causes...
- Congenital Deformities/Abnormal Development
- Trauma/Injury – acute/repetitive.
- Ergonomics – postural strain (seated/sleep), poor adaptation to gravity, etc.
- Movement pattern dysfunction – acquired/habituation.
- Compensation/Protective Patterning
- Stress, poor nutrition, psychosocial factors...
- Age – tissue changes, decrease in number of proprioceptors, etc.

Joint Dysfunction

- Age, Adaptive Changes, Injury...
  - Alter musculoskeletal tissue tolerance to stresses (reduced).
  - What was once a non-destructive stimulus may now be destructive or cause injury to the tissues.
  - Lowered maximal limit of tissue tolerance.

- Immobilization...
  - Decreases overall strength of tissues.
  - Deterioration of cartilage, tendons, ligaments, and muscles.

Joint Dysfunction

The “Goldilocks Principle”
Not too much
Not too little
Just right!

Need adequate and controlled approximation of joint surfaces for ideal function.
Maintaining Musculoskeletal Health

- Requires activity that places controlled stresses on the tissues.
- Requires stimulus of non-destructive stresses:
  - Forces of movement, weight-bearing, and muscle contraction that load the MSK tissues within their physiologic limits.

Triad of Stability

The Spinal Stabilizing System

Structural vs Functional Stability

Structural Stability (Form Closure):
- Anatomical architecture of joints and ligaments.
- Shape (think Lego blocks)

Structural vs Functional Stability

Functional Stability (Force Closure):
- Muscular forces which act on the joints and ligaments to preserve relationships (Think tennis balls in a can).
- Ideally, these forces will compress the joints in the area with the most mechanoreceptors and the thickest articular cartilage.
- This allows stability during movement and optimal load transfer.

Joint Centration

- Optimal joint position that allows for the most effective mechanical advantage.
- A centrated joint has the greatest interosseous contact to allow for optimal load transference across the joint and along the kinetic chain.
- Balanced function of muscular activity at any moment of time during the movement.
In order for us to treat something, we must first understand what we are treating.

About our joints:

**Histology:**
- Within the joints, ligaments, muscles and tendons, there are mechanoreceptors, which give the central nervous system information about position and movement.
- There are also nociceptors, which give our brain information about tissue damage.

Our brain establishes muscle recruitment strategies and movement patterns based on proper deformation of tissue receptors.
- In the presence of joint restriction or instability (AKA Joint Dysfunction), this information is less accurate.
- Tissue receptor pools appear to be in the highest concentration in the area of the joints with the most articular cartilage. (Porterfield and DeRosa 2004)

Dysafferentation: (Seaman 1998)
- When there is inappropriate control of a joint it can become restricted or unstable.
- This creates faulty mechanoreceptor feedback, which results in an increase in nociceptor feedback.
- This has effects at the segmental level and the cortex (see diagram).

When nociception occurs, we experience:
- Reflex muscle spasm
- Vascular changes
- Visceral symptoms
- Perception of pain
The Adjustment – Neurological Effects

The adjustment inhibits the transmission of nociception, thereby:
- inhibiting sympathetic activity
- pain
- reflex muscle spasm...

NON-RANDOMIZED CONTROL STUDY
3 GROUPS: LBP GROUP, CONTROL GROUP, ASYMPTOMATIC GROUP.

TWO SMT TREATMENTS IN ONE WEEK

- PARTICIPANTS REPORTED PAIN & DISABILITY LEVELS AFTER SMT.
- RESEARCHERS USED US, MRI, ETC TO MEASURE MUSCLE ACTIVITY, PROPERTIES WITHIN THE IVD, SPINAL STIFFNESS.

RESULTS:

- DIFFERENT GROUPS OF PEOPLE RESPOND DIFFERENTLY TO SMT.
- RESPONDERS REPORTED LESS PAIN RIGHT AWAY, SHOWED IMPROVEMENT IN BACK MUSCLE THICKNESS, DISC DIFFUSION AND SPINAL STIFFNESS.
- THESE EFFECTS REMAINED THAT WAY FOR THE WEEK OF TREATMENT.
- NON-RESPONDERS REPORTED NO IMPROVEMENT AND SHOWED NO PHYSICAL CHANGES.

THE "BOOP" THEORY (Elder)

- Bones do not come out of place, and chiropractors do not put them back in.
- Joints get restricted and adjustments put movement back in these joints.
- Dysaffectiveation.
Pathophysiologic Consequences of the Presence of a “Manipulable Lesion” (P.A.R.T.S.)

- Pain
- Asymmetry
- Relative ROM
- Tissue temperature, texture, tone changes
- Special test findings

Clinical judgement based on findings.

Not Neutral

- Flexion
- ???
- Flexion

Joint Play

- All synovial and secondary cartilaginous joints are capable of an active ROM (voluntary). However, there is a small range of motion that can be obtained only passively by the examiner — AKA JOINT PLAY

(MAGEE, ORTHOPEDIC PHYSICAL ASSESSMENT)

Joint Dysfunction

- A loss of joint play movement that cannot be restored by the action of voluntary muscle.

- Block of wood or brick of cheese??
  (Dr. Len Faye)

Therapeutic Joint Play

- “Accurate diagnosis of joint dysfunction is a pre-requisite for therapeutic manipulation. The restoration of joint play through manipulation results in restoring anatomic and physiologic synovial joint function. Treatment is accomplished by quickness with accuracy, less than an 1/8” in the plane of the joint.”
  - Mennel J.

Motion Palpation Exam

- Pain that lingers after the joint challenge often represents inflammation and not joint restriction.

- The examiner should only adjust those joints that do not function properly (i.e. exhibit the normal end-feel at the end of their normal physiologic ranges of motion).
"The ability of the doctor of chiropractic to detect restricted articular motion or hypermobility may mean the difference between success and failure with many patients" (Dr. Henri Gillet)

- Primary vs. Secondary
- Adjusting a primary fixation will cause palpable changes elsewhere in the spine and better results
- Adjusting a secondary fixation offers momentary relief, but dysfunction is quick to return (Faye, 1990)

"NOT ALL VERTEBRAL SEGMENTS HAVE THE SAME IMPORTANCE, WE THEREFORE MUST SPEAK OF KEY REGIONS OR SEGMENTS OF THE SPINE" (LEWIT, 1999)

- These are mostly transitional areas where the function of the spine changes
- Cranio cervical, cervicothoracic, thoracolumbar, lumbosacral, and feet
- This is where primary restrictions occur and where most adjustments should be given (even if pain is not there)

"The segments that show the most degeneration are at the places of the spine where the most movement occurs" (Sahrmann, 2002)

"Restriction of motion of one part of the spine causes increased motion of another part of the spine" (Nordin, Frankel, 1989)

- The MSK system including the spine is a closed kinetic chain. SHARED – EFFICIENT motion is the goal of the NMS system.

THE SPINAL ENGINE

Structural Problem but.....FUNCTIONAL CAUSE

Is MP unreliable?

- Variation in palpation procedure
- Poor identification of spinal levels between examiners
- Inappropriate landmark rules
- Spinal restrictions being reduced due to mobilization that occurs during the palpatory procedure

Is MP Reliable?

- Good index of agreement when both examiners were confident in their findings.
  - Design flaws of previous MP reliability studies:
    - Fixed or Not? No option to say “can’t tell” or unknown.
    - Fixation may involve multiple levels...rather than identifying a specific level (i.e. T8-T9), ask “how close were the examiners findings to each other?”
Is MP Reliable?

- Choices in clinical practice
  - Confidence in your palpation...treat what you find.
    - If it’s restricted, manipulate it.
    - If it’s not, leave it alone.
  - Palpation is just one piece of the puzzle, not the whole thing.
  - What treatment intervention you apply and where you apply it is determined by extracting as much information as you can out of all of your assessment tests/tools then making your best clinical judgement...note the outcome and patient’s response to treatment. This is clinical practice.

Motion Palpation & Reliability

AN INVESTIGATION INTO THE VALIDITY OF CERVICAL SPINE MOTION PALPATION USING SUBJECTS WITH CONGENITAL BLOCKED VERTEBRAE AS A 'GOLD STANDARD'. HUMPHREYS BK, DELAHAYE M, PETERSON K.

CONCLUSION:

THIS STUDY INDICATES THAT RELATIVELY INEXPERIENCED EXAMINERS ARE CAPABLE OF CORRECTLY IDENTIFYING INTER-SEGMENTAL FIXATIONS (CBV) IN THE CERVICAL SPINE USING 2 COMMONLY EMPLOYED MOTION PALPATION TESTS, THE USE OF A 'GOLD STANDARD' (CBV) IN THIS STUDY AND THE SUBSTANTIAL AGREEMENT ACHIEVED LENDS SUPPORT TO THE VALIDITY OF MOTION PALPATION IN DETECTING MAJOR SPINAL FIXATIONS IN THE CERVICAL SPINE.

Concepts – Palpation

CONCEPTS – PALPATION

Palpation - Adjustment

Concepts – The Adjustment

A definition:
A position (a setup) --- which initiates an action – with a force added

Adjesting is...

...adding FORCE to a MOTION that is already in progress.

Introducing force vector into joint to restore joint motion.

Concepts - Specificity

- The size of the contact has no bearing on the specificity of the adjustment (make it comfortable!)
  - JK Ross - ACC presentation
- The amount of noise (number of clicks) has no bearing on the specificity of the adjustment - no reference - this is just silly !!!
“Specificity is not what you contact, it’s what you create” – Dr. Elder

The greatest weakness of the chiropractic profession is the strength of the chiropractic adjustment

Dyck & Embree, JMPT 1984

Effects of the Adjustment

Causes EMG excitement of muscles followed by inhibition.

Decreases pain, softens muscles, EMG quieter (RR).

Did not happen for all patients

Is Cavitation Essential?

Cavitation does not guarantee reflex response (RR).

Quickness of manoeuvre dictates RR.

- Even Activator does it...slow manipulation will not.

RR occurs consistently in distal parts of body, not just site of treatment (i.e. SIJ manipulation showed changes in EMG activity in arm and leg in some subjects).

Males vs. Females

Exerted similar peak force during SMT performed in the T/S...

Actually, females exerted slightly HIGHER peak forces during SMT.

Effects of the Adjustment

Patients will ask you what the adjustment does...make sure you know!

Keep it simple but be accurate...they can handle the truth.
**Concepts – Palpating & Adjusting**

**Psychomotor Skills**
- Palpation & Adjusting are Psychomotor Skills
- Examples of Psychomotor Skills are a great golf swing, a basketball shot, etc.
- All require knowledge of the activity and then practice with purpose.
- Practice doesn’t make perfect...perfect practice makes perfect!

**Levels of Competence:**
- A - Unconsciously Incompetent
- B - Consciously Incompetent
- C - Consciously Competent
- D - Unconsciously Competent

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**What Makes Great Adjusters**

- Developing "power" from within (Core Stability).
- Speed (not strength) very shallow thrusts.
- Set-up.
- Knowing exactly how joints work.
- RELAX!

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**Adjusting...**

- Be methodical with your set-up and patient positioning...should mimic the motion you are trying to create.
- Pay attention to what you palpate and where the joint is restricted...then make the joint do what it should be doing.
- No “lock out”.
- Impulse/thrust efficiently and quickly.
- Transfer the energy from your body, through your contact, to the patient.

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**“Chiropractic Physics”**

FORCE = m x a

THE NEED FOR SPEED!!!

*If you lack mass, you have to develop greater acceleration to generate appropriate FORCE.*

A little finesse wouldn’t hurt either.

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**Adjusting...**

- Develop your core.
- Stay relaxed. If you’re too tight your energy will be wasted and you won’t be able to deliver an effective thrust...completely relax before impulse.
- The name of the game...speed, speed, speed.
- Practice your adjusting drills!
- Use tricks as needed...
- Remember...practice doesn’t make perfect...perfect practice makes perfect.

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**The Equipment Must Be Right**

- Table Height:
  - Below patella for side posture adjusting.
  - Consider elevation table to accommodate various techniques.
- Chair Height:
  - Should match table height.
  - Top of patient’s head below level of xiphoid.
The Art of Adjusting

- Athletic event
- Training
- Practice
- Training should mimic what you’re doing
- Understand force generation
- Force and Speed
- Finesse?

Where to begin?

- The spine is a mechanical structure designed for dynamic function.
- Does simply taking a “picture” or asking it questions give us adequate information?
- Both the assessment and treatment of this structure needs to be functional.
- We need to understand how the system functions so we know how to treat it.

Pathology...

- Demands your attention first. Be a Diagnostician.
- Needs to be identified and appropriately managed.
- When movement dysfunction is suspected and pathology has been ruled out, assess function, treat dysfunction, and prescribe corrective exercises as indicated.

Diagnosis? Instead Ask Why...

When you see a problem, ask yourself WHY and HOW?
- Anything can cause anything...
- Become an expert at functional assessment of the kinetic chain.

Motion Palpation

Do I really need to palpate every joint in the axial and appendicular skeleton???

**No**

Utilize the findings from your physical/orthopedic/functional exam to determine what joints of the spine and extremities need to be assessed further.

The better you understand function, the more efficient you will be with your exam.

Functional Manual Care

GATHERING INFORMATION WITH OUR EYES AND OBSERVING MOVEMENT IMPAIRMENTS (JANDA, SAHRENN, O’CONNOR)

GATHERING INFORMATION WITH OUR HANDS- JOINT MOTION PALPATION (MENNEL, LEWIT, ILLI, KALTENBORNE, GILLET, FAYE, ETC)

A PERFECT MARRIAGE

PRIMARY DYSFUNCTIONS WILL SHOW UP IN BOTH ASSESSMENTS AND GUIDE THE CLINICIAN ON KEY AREAS FOR TREATMENT
The Examination

Important Examination Procedures:

- Palpation
  - Joint Palpation (joint play, motion analysis, sphincts)
  - Muscle palpation (tone, texture, tenderness, TrPs, length)
- Observation
  - Postural Evaluation
  - Functional Assessment, Gait Assessment, etc.
- ROM, ortho/neuro assessment

UPPER CROSSED SYNDROME

- Shortened: Sub-occipitals, SCM, Scalenes, Pecs, Levator Scapulae, iliacos, rect fem, TL extensors.
- Weak: DNF and Scap Stabilizers, abdominals, glutes.

LOWER CROSSED SYNDROME

- Tight Thoraco-lumbar Extensors
- Weak Glutes
- Tight iliopsoas & Rectus Femoris

Postural Dysfunction

Common Findings:
- Shortened: Sub-occipitals, SCM, Scalenes, Pecs, Levator Scapulae, iliacos, rect fem, TL extensors.
- Weak: DNF and Scap Stabilizers, abdominals, glutes.

Respiration considerations.

Treating The Cause?

- Touch them where it hurts!
- Is there more to it?
- How should the system function?
- Where is the dysfunction?
- Tell them what they need...give them what they want. Patient preference!

Questions to Ask...

- What do you hope to achieve from this visit? Check all that apply.
  - Pain relief
  - Explanation of your condition
  - Exercises to prevent recurrence
- Are you seeking: 
  - Lasting corrective care
  - Temporary relief
- Circle the word that best describes the way you feel about your general health:
  - Excellent good acceptable uneasy concerned
  - very concerned
- frustrated
distressed
unbearable
- Have you recently experienced a major upset in your life? □ Yes □ No
- Explain:
Evidence Informed Care

- 'Evidence-Based Medicine' (EBM). This term implies that 'evidence' (in whatever form) is all that matters. This is inaccurate and not reflective of the original EBM model proposed by Dr. Sackett and colleagues over 15 years ago. That model proposes that EBM is a three-pronged approach to clinical practice and patient care, including equal contributions from: 1) the best available scientific evidence; 2) patient preference; and 3) the experience of the clinician. Taking the entire model into consideration, a more appropriate term in most cases is evidence-informed care.

Prioritize

- What’s most important?
- What can I/the patient affect/change?
- Top 3.
- What is the patient willing to do?

What’s in your tool box??

- MPI-
  - Manipulation
  - Mobilization
  - Functional Assessment
  - Nutrition
  - Rehabilitation
- Manual Soft Tissue Techniques
- IASTM

Treatment

- If the only tool you have is a hammer, you tend to see every problem as a nail.
  - Abraham Maslow

Treatment

- Treatment should be inclusive to affect all the tissues that can influence movement. Each treatment should be tailor made to fit the patients dysfunction.

  Manipulation, mobilization, soft tissue work, stretching & diet/nutrition should be a part of every doctor’s practice regimen...or refer out as necessary.
### OBJECTIVES FOR WEEKEND

- How does the joint work?
- How do you palpate it?
- How do you adjust it?
  - Learn how to body drop AND
  - Learn how to kick (Push & Pull) AND
  - Learn how to thrust in a cervical chair
  - If you can learn this, you can adjust anything.

### Force Generation for the pelvis & lumbar spine

- All adjustments require the patient to be placed in the EXACT position that will initiate a joint movement or action and then a force is applied
- Several methods of force generation can be utilized depending on the size of the patient or doctor, the amount of force needed, and personal preference.

#### Leg-Assist (KICK)
- Increased speed and opening of the joint by depressing the leg with a very quick but short amplitude kick. Should NOT be used to create a "twisting torque".
- PUSH – the doctor is oblique to the table (doctors over ~6'2" typically have to stand almost parallel to the table) – and the entire mass above the knee is allowed to drop to generate force with no torque
- DO NOT PRELOAD the LEG

#### Body Drop
- Oblique or Parallel Stance
- Doctor stands oblique to the table (doctors over ~6'2" typically have to stand almost parallel to the table) – and the entire mass above the knee is allowed to drop to generate force with no torque

#### Force Generation for Seated Adjusting

- Doctor’s stance is key!!! Stay parallel to patient.
- Make contact with the area you’re going to adjust.
- Place supportive hand appropriately.
- Nicely control the patient's head!!
- “Let your contact sink into the joint...and feel for end range of joint motion as you…”
- "Go for a walk..." short for C0-C2, bigger for CT jct and T1 rib.
- Take a bow (i.e. Hip Hinge).
- Stay close!
- RELAX your shoulders!!!
- Thrust (pec contraction/cough).

*see addendum
Addendum

- Contact hand:
  - relaxed, neutral/slight extension...like you’re asking for change...no ulnar deviation.
  - ‘place’ contact hand at area you are adjusting.
  - ‘receive’ head and let it rest on your thenar pad/relaxed palm.
  - SINK into your set-up...follow joint to end feel (NOT lock out).

Mobilization

- Mobilization - the definition of mobilization is using a force that results in movement that does not produce an audible click. Many of the extremity adjustments you have learned would fit into this category. There are many factors to consider when deciding between mobilization or an adjustment.

  - Mobilization - the definition of mobilization is using a force that results in movement that does not produce an audible click. Many of the extremity adjustments you have learned would fit into this category. There are many factors to consider when deciding between mobilization or an adjustment.

  - The first deciding factor is risk. In other words, would the typical adjustment performed in some way damage the patient? Also very important is risk to the doctor. A 350 pound patient in need of improved SI function and a 110 pound doctor create a biomechanical short fall in terms of leverage and control. It is perfectly acceptable to perform mobilizations in these situations and the doctor survive undamaged to treat the rest of his / her more normal size patients.

  - Another reason for mobilization is patient comfort. Often the patient’s acute pain will prevent otherwise simple side-posture adjustments. Until such a time as the patient can handle a more forceful side posture adjustment, mobilization will begin to create movement in the direction needed for improved function.

Weekend Agenda

**Saturday**

- Initial Screen
  - Seated scan
  - Sphynx

- Body Drop – General
  - Pelvic
  - Atlas – Axis
  - L5/S1 with/without Rot.
  - Seated Adjustments
  - CT-Axial/Upper T/S
  - Ext/Ab/ROT
  - Seated, Prone, Supine Adjustments
  - Kick Pull - General
    - SIJ/LS Junction Adjustments
    - Nutation/Counternutation

**Sunday**

- Review
  - Mobilizations
    - SI Joint
    - Lumbar/TL-Junction
    - Ext/Pull, Side Posture Drop, Kick
  - Occiput – Atlas
    - L/F/L with/without Rot.
    - Seated, Supine Adjustments/Seated
  - 1st Rib
    - Seated, Supine adjustments/Mobilization
  - Subject to change

Palpation

- The Seated Scan
  - 6-point pelvic check
  - F/S to Co
  - Recheck T4 to Co

- The Sphinx Position

- Regional Specific Palpation
  - Anatomy-specific (C-T-L-P)

Initial Screening Tools

- Patient must be in a neutral posture to allow full normal physiological motion to occur
- the palpation device must be passive

Palpation: The Seated Scan

- OR
Palpation: The Sphinx Position

- An alternative method is to have the patient in a fixed position if testing for a single motion at end range.

The Seated Scan

- The seated scan is utilized initially to localize an area of dysfunction & then the three joint complex is assessed for all ranges of motion (joint play) normally available to that area. Each area of the spine is anatomy specific.
- Must be performed within the theoretical limits of the neutral zone.
- The accuracy of the test is dependent on the doctor’s skill and the ability to reproduce the same seated posture.
- Not a perfect examination tool.

Seated Scan Tweaks

- This position makes upper t-spine palpation easier.
- See modification for smaller docs/larger patients.

Seated Scan Tweaks

- Patient’s hands interlaced behind the head & Glide the pt. forward & support your palpating arm on your knee. Glide forward and feel for approximation of the SP’s and anterior glide and a spongy feel. Let knee do the work, hand is passive.

Seated Scan Tweaks

- Modification for small Dr./larger patient.
- This position makes upper t-spine palpation easier.
- Can be used as an option for mobilizing T/S (incorporate PIR).

Movements of the Pelvis

- Sacroiliac Joint/Lumbosacral Junction:
  - Upper SI Flexion (Posterior “Rotation” of the ilium)
  - Lower SI Flexion (Posterior “Rotation” of the ilium)
  - Counter Nutation (sacral base “nods” posteriorly)
  - Nutation (sacral base “nods” anteriorly)
The Sacroiliac Joint

• "...we know that the SIJs are capable of a small amount of both angular (1-4°) and translatory motion (1-3mm), that the amplitude of this motion is variable between subjects; however, within one subject it should be symmetric between sides. (The Pelvic Girdle, Lee, 2004)"

• "The essence of the SI joint is that it is a stress-relieving joint...the joint is placed strategically in the pelvic ring at the site of maximum torsional stress in order to relieve that stress" (Clinical Anatomy of the Lumbar Spine and Sacrum, Bogduk, 1997)

• "The degree of mobility in the SI joint should be as little as possible, yet never to the point of restriction, just as a shock-absorber is firm but never immobile." (Manipulative Therapy, Lewit, 2010)

May not be the pain generator but that doesn’t mean it’s not the problem!

SIJ Palpation - Seated

• Patient seated in neutral.
• Doctor’s thumb/thenar pad is placed medial to the PSIS.
• Joint play P to A & medial to lateral, feeling for a springy end feel.
• Assess bilaterally and compare.
  ○ Tip: Back up elbow of palpating hand by placing it at hip/inner thigh for better control.

SIJ Palpation - Supine

• Doctor’s cephalic hand grasps patient’s contralateral leg, bringing it into flexion and adduction...knee at doctor’s pre...shot put position.
• Place caudal hand across SIJ
• Take up the slack by exerting pressure through the line of the femur toward the contact hand at SIJ...body lean.
• Apply pressure into SIJ feeling for a springy end feel.
• Palpate at various degrees of hip flexion.
• Assess bilaterally and compare.

SIJ Palpation – Side-lying

• Doctor flexes and adducts patient’s top leg.
• Patient’s knee is supported between doctor’s inner thighs.
• Place one hand across the SIJ and reinforce with the other...keep arms straight.
• Using her knees, the doctor exerts pressure through the line of the femur to take up the slack.
• Apply pressure through the SIJ feeling for a springy end feel.
• Palpate at various degrees of hip flexion.
• Assess bilaterally and compare.

SIJ Palpation - Prone

• Angle patient so their shoulder is toward the back of the table, hips in the centre (or slightly forward), and legs toward the front edge of the table.
• Patient’s bottom knee slightly flexed. Adjust hip angle accordingly for adjustment being performed.
• Slide bottom hip forward until acetabuli are vertical. HAVE PATIENT ASSIST YOU.
• Cement bottom shoulder by dragging bottom arm down and forward (facing away from doctor)...
• Patient’s top arm should be resting at their side.
• Their bottom hand should grasp their top elbow.
***larger patients – hand should grasp forearm.

Side Posture Patient Positioning

• Angle patient so their shoulder is toward the back of the table, hips in the centre (or slightly forward), and legs toward the front edge of the table.
• Patient’s bottom knee slightly flexed. Adjust hip angle accordingly for adjustment being performed.
• Slide bottom hip forward until acetabuli are vertical. HAVE PATIENT ASSIST YOU.
• Cement bottom shoulder by dragging bottom arm down and forward (facing away from doctor)...
• Patient’s top arm should be resting at their side.
• Their bottom hand should grasp their top elbow.
***larger patients – hand should grasp forearm.
SIJ Adjustment
Side Posture Body Drop

- Perfect side posture patient positioning.
- Doctor stands oblique to the table with her stance foot placed at the level of the contact plus ~2” cephalad, and her ankle dorsi-flexed.
- Patient’s pelvis is rolled forward until the patient is under the doctor’s center. See your contact.
- Contact SIJ with palm/hypothenar/whatever is comfortable for you and patient.
- Roll the patient into your home (bring your work under you). Centre contact in sternum. DO NOT REACH FOR PATIENT.
- ‘Gently’ make a snowball…this will tuck elbow in and protect shoulder.
- Drop and slight thrust on impact with the patient.

Body Drop Tips

- Placement of stance leg is key.
- Weight is on front leg, back leg is “hanging out”.
- Do not place stance leg perpendicular to table...need room for your knee to “collapse” to make drop happen!!
- Taller docs will be more parallel to table.
- Shorter docs will be more obliquely oriented.
- “Go bowling” with back leg...square hips...protects knee.
- Front knee “collapses” along table with body drop...let it go!

Body Drop Tips

- Slight rounding of the spine is ok (NO posing, twisting, rotating, bobbing, chicken pecking).
- Contact hand transfers force generated by body drop through restricted joint.
- Should be able to see back of your hand before drop...plane of the joint in direction of thrust.
- Look at what you’re adjusting...not across the room.
- No success...recheck patient positioning!

Side Posture Body Drop

- Perfect side posture patient positioning.
- Doctor stands perpendicular to the table, stance foot at the level of the ASIS with knee resting against table.
- Patient’s pelvis is perpendicular to the table top.
- Contact upper PSIS with flat DIP contact - third & 4th digits.
- “Thigh master” squeeze for stability/control.
- Kick & Pull Simultaneously.
- Can also be done using kick push.

Side Posture - Leg Assist KICK PUSH

- Perfect patient position.
- Doctor stands oblique to table, knee at level of contact plus a”.
- Knee rests against edge of table with ankle dorsi-flexed.
- Patient’s pelvis is perpendicular to the table top.
- Place supportive hand on back of patient hand.
- Doctor places her knee at patient’s ischial tuberosity/dorsum of foot against patient’s patella.
- Doctor’s stance is “regal”, more upright, standing tall.
- Stay light. No pre-stress with leg.
- Take contact...slight tissue pressure.
- “Thigh Master” = control.
- Kick & thrust simultaneously.

KICK PULL & PUSH TIPS

- Placement of stance leg is very NB.
- Ankle must stay dorsi-flexed for stability.
- Doctor must feel stable to generate appropriate force...“Thigh Master”.
- Taking contact is the last thing you do before ‘thigh master’ squeeze and kick.
- Push requires pec/tricep action.
- Pull is into your body...elbow into side of torso.
- Kick must be short and quick...kick like a soccer ball is under the table, not like you’re starting a Harley.
- TRICKS...
KICK PULL & PUSH TIPS

- Kick will happen a split second before the push/pull, but think of it as happening at the same time.
- Good technique for larger patients.
- Good technique for smaller doctors.
- Practice kicking drills (back foot on ball, Theraband).

SIJ ADJUSTMENTS

- Kick: Pull: Pt. is neutral and stays that way. Double finger contact → Elbow is tucked → Kick and pull happen almost simultaneously. 1.
- Drop: Patient alignment is neutral. Roll the patient far enough so the SIJ can be sheared. 2.
- Kick-Push: Pt. position is a mix between the first 2 adjustments. Kick and push happen almost simultaneously. Push is a quick pec contraction. 3.

SIJ Mobilization

- Patient Supine on drop type table or speeder board under SIJ.
- Add hip flexion/slight adduction (no impingement).
- Contact is broad gentle contact over ASIS.
- Straight arm thrust powered by a slight drop.

Atlas-Axis Palpation

- Movements of Atlas-Axis
  - “Pure” Lateral Flexion
  - Lateral Flexion with Contralateral Rotation
  - Lateral Flexion with Ipsilateral Rotation

PRACTICAL APPLICATION

- Although the upper cervical complex is divided into the occipito-atlanto and atlanto-axial articulations, the occiput, atlas, and axis do not move independently (Porterfield and Derosa, 1995)

Atlas-Axis Coupled Motions

- LF & Contralateral Rot & Ext
- LF & Ipsilateral Rot & Flex
- "Pure" Lateral Flexion
- LF & Ipsilateral Rot & Flex
Atlas-Axis Lateral Flexion Palpation

- Contact TP's
- Allow Lateral Flexion
- Test "PURE" Lateral Flexion

Test @ ~10 degrees rotation
- Toward palpation contact hand - Ipsilateral
- Away from palpation contact hand - Contralateral

Atlas-Axis Coupled Rotation Adjustment

Contact: Tip of thumb or radial aspect index MP/PIP on C1 TVP.
Laterally flex/rotate at level of contact
Thrust: Across the shoulders

C/S Manipulation and CAD


> VBA STROKE VERY RARE EVENT

> INCREASED RISKS OF VBA STROKE ASSOCIATED WITH CHIROPRACTIC AND PCP VISITS IS LIKELY DUE TO PATIENTS WITH HEADACHE AND NECK PAIN FROM VBA DISSECTION SEEKING CARE BEFORE THEIR STROKE

> EQUAL PROBABILITY OF HAVING STROKE AFTER SEEING M.D. OR D.C.
REPLICATION OF CASSIDY ET AL. STUDY IN A U.S. POPULATION

NO ASSOCIATION BETWEEN CHIROPRACTIC VISITS AND VBA STROKE...HOWEVER, THERE WAS AN ASSOCIATION BETWEEN PCP VISITS AND VBA STROKE.

"IN SPITE OF WHAT SEVERAL OTHER CASE-CONTROL STUDIES HAVE REPORTED, THIS STUDY FOUND NO SIGNIFICANT ASSOCIATION BETWEEN EXPOSURE TO CHIROPRACTIC CARE AND THE RISK OF VBA STROKE. THIS FINDING STRENGTHENS THE VIEWPOINT THAT CHIROPRACTIC CARE IS NOT LIKELY A CAUSE OF VBA STROKES; THEN AGAIN, IT DOES NOT TOTALLY EXCLUDE CERVICAL MANIPULATION AS A POSSIBLE CAUSE OR CONTRIBUTORY FACTOR IN THE OCCURRENCE OF VBA STROKE."

PURPOSE:

> IDENTIFICATION OF INDIVIDUALS AT RISK

> EARLY RECOGNITION OF DISSECTION IN PROGRESS (AVOID BEING IMPLICATED IN THE CAUSE OR POTENTIALLY PROGRESSING THE PATHOLOGY)

C/S Manipulation and CAD


C/S Manipulation and CAD


C/S Manipulation and CAD


T/S Manipulation and Neck Pain

> REDUCED NECK PAIN

> IMPROVED NECK ROM

> IMPROVED DYSFUNCTION

> IMPROVED NECK POSTURE

...for patients with chronic mechanical neck pain for up to 6 months post-treatment.

The effectiveness of thoracic manipulation on patients with chronic mechanical neck pain – A randomised controlled trial (Manual Therapy, 2010)
Biomechanics of Dysfunction

**Protraction (FHP):**
- Upper t-spine & mid/lower c-spine → FLEXION.
- Upper C-spine → EXTENSION.
- Distortion of muscular forces (i.e. SCM verticality).

**Retraction (chin tuck/ nodding "yes"):**
- Upper t-spine & mid/lower c-spine → EXTENSION.
- Upper C-spine → FLEXION.
- Approximation and efficient muscular interaction.

Biomechanics of the Cervical Spine

- Local stability of the cervical spine.
- Mobility of the upper T/S
- Overactive sub-occipitals often found with HA complaints.
- Trigger point referral common HA patterns (Travell Simon 1990)

Seated CT Junction Palpation- Lateral Flexion

This is doctor and patient positioning for left lateral flexion at T1. The doctor’s thumb is placed against the T1 spinous process. The patient’s head is laterally flexed to the left with the doctor joint playing from left to right against the spinous process for relative lateral flexion.

Seated CT Junction Palpation - Extension

This is the patient and doctor placement for palpation of the left T1/2 facet for extension. The doctor brings the head further into extension pushing P-A for joint play using the doctor’s thumb.
CT Junction Adjustment - Seated

- Top of pt head at/below xiphoid process.
- Bring pt into neutral spine position.
- Place contact at level of restriction (PIP of index finger buddyed up with middle finger).
- Place supportive hand (fingers pointing down, elbow high)
- Lateral flex at level of contact...sink into it.
- Allow rotation/extension.
- Stay relaxed!
- Thrust across.

T4 Scan

- This position makes upper t-spine palpation easier
- Can be used as an option for mobilizing T/S (incorporate PIR)

CT Junction Palpation – Side-lying

CT Junction Adjustment - Prone

- Patient prone with arms beside them on table.
- Place thumb lateral to spinous of restricted joint.
- Doctor’s lead foot slightly forward of patient’s shoulders in fencer stance...body lean.
- Patient rotates head away from contact.
- Supportive hand (thenar) contacts mastoid and tractions head cephalad.
- Thrust across.

Upper Thoracic / CT Adjustment

Contact Variations

OR

Upper Thoracic Adjustment

See Demo.
Can also be used for upper costotransverse articulation.
See modification for larger patient.
T4 Extension

- Anatomically the cervical spine goes from C0-C7.
- Functionally, it extends to T4.

Significance of T4 Extension

- For proper DNF activation.
- For proper eccentric activation of the anterior abdominals.
- For proper loading of the scapula.

Thoracic Adjustments

Extension Procedure:
1. Neutral Supine Position
2. Roll patient toward doctor
3. If contact is below T6, step cephalic
4. Contact Hand – Variable depending on desired movement
5. Compress toward contact
6. Roll patient onto contact
7. Very small body drop – very powerful

Other Options

SEATED/STANDING/WALL THORACIC ADJUSTMENTS

“WWF” THORACIC ADJUSTMENT
SIDE-POSTURE TL ADJUSTMENTS

What about the mid C/S? The What??

SAME PALPATIONS AS CT JUNCTION
NOT TYPICALLY WHERE YOU NEED TO BE APPLYING YOUR ADJUSTMENTS
ASK YOURSELF...WHAT SEGMENTS MOST COMMONLY DEGENERATE IN THE C/S???
FOCUS ON PRIMARY RESTRICTIONS!
Upper T/S Mobility...and the Neck

- Normal mechanics of the cervical spine and shoulder are dependent on normal mobility of the upper thoracic spine.

- A habitually flexed upper T-spine posture may reduce the capacity of the muscles, which provide CT retraction.

Upper T/S Mobility...and the Neck

- Upper ribs will be drawn into anterior rotation.

- Restricted upper thoracic mobility may increase the demands on the more mobile lower cervical segments, with potential for symptom development or exacerbation (i.e. C/S DDD/DJD).

The effectiveness of thoracic manipulation on patients with chronic mechanical neck pain – A randomized controlled trial (Manual Therapy, 2010)

- 4 TREATMENT SESSIONS:
  - Experimental: Infrared Radiation Therapy + Education + TM
  - Control: Infrared Radiation Therapy + Education

OUTCOMES ASSESSED IMMEDIATELY POST TX, 3 MTHS, 6 MTHS
- Reduced neck pain
- Improved neck ROM
- Improved dysfunction
- Improved neck posture


- 45 PATIENTS (21 FEMALES)
  - CONTROL GROUP: 5 ELECTRO-THERMAL THERAPY SESSIONS
  - EXPERIMENTAL GROUP: SAME + THORACIC SPINE THRUST MANIPULATION 1X/WK 3 WKS.

RESULTS
- EXPERIMENTAL GROUP: EXPERIENCED GREATER IMPROVEMENTS IN PAIN AND DISABILITY. PERSISTED BEYOND 3 MONTH FOLLOW-UP PERIOD (ACUTE NECK PAIN)
- MORE STUDIES NEEDED TO INVESTIGATE EFFECTS OF T/S MANIPULATION COMPARED TO OTHER PT INTERVENTIONS FOR MECHANICAL NECK PAIN.

T/S Mobility...and the Shoulder

- Upper T/S extension is required to accommodate the later range of bilateral flexion of shoulders, while ipsilateral lateral flexion of the upper T-spine is observed during unilateral shoulder elevation (Culham & Peat 1993).

- Upper T/S ipsilateral coupling pattern between lateral flexion and rotation in association with extension during arm elevation (Theodoridis D, Ruston S., 2002).

- Lower T/S extension is required during overhead arm movement, esp. with both arms in an elevated position (as seen with overhead press or overhead squat).

Upper T/S Mobility...and the Shoulder

- Changes in upper T/S mobility may lead to sub-acromial pathology due to the effects on scapular and glenohumeral mechanics (Sobel et al 1996).

- Restriction of upper rib mobility may produce symptoms of impingement (shoulder) or TOS (Lindgren & Leino 1988, Boyle 1999).
**The short-term effects of thoracic spine thrust manipulation with shoulder impingement syndrome.**  

- **EXPLORATORY STUDY... SOME LIMITATIONS.**
  - one group (56 subjects) , pretest/post-test (no control)
  - not randomized, short duration.

- **BUT ENCOURAGING RESULTS...**
  - T/S thrust manipulation (TSTM) and non-thrust manipulation and exercise effective for treatment of patients with SIS.
  - Statistically significant decrease in self reported pain measures and disability in patients with SIS at 48 hours follow-up.

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**The immediate effects of thoracic spine & rib manipulation on subjects with primary complaints of shoulder pain.**  

- **SUBJECTS WITH SHOULDER PAIN WERE TREATED DURING A SINGLE TREATMENT SESSION WITH HIGH VELOCITY THRUST MANIPULATION TO THE THORACIC SPINE OR UPPER RIBS.**
  - **POST-TREATMENT EFFECTS:**
    - 51% reduction in shoulder pain
    - Increased shoulder ROM

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**Neutral Spine (NS) Take Homes**

- Patient has to “find a new home”.
- MOVEMENT is paramount...must happen often!!!
- Micro-breaks & frequent systems checks!
- Self-mobilization - foam roller/stability ball, wall extension, upper back cat, etc.
- Seated NS = Hips above knees (60 °), ribs and pelvis parallel, shoulder blades in back pockets, crown of head to sky...passive and relaxed!!!
- Think about making your spine long/tall...imagine someone pulling up on a hair at the crown of your head.

---

**Thoracic Extension Mobilization**

- **Snow Angel:** The roller can be placed vertically along the spine for support. The arms are then lifted above the head at 45 degrees (palms up). This will provide a good stretch to the pec minor and pec major muscles. 1 minute, 1-3 times daily.

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**Thoracic Mobilization**

- **Gravity-assisted T/S Mob**
**T/S Wall Extension - Micro Break**
- Perform several times throughout day as a microbreak.
- Can be done sitting on a chair or stool also.
- Hold for 20-30 sec. or for 3-5 deep breaths.

**Self T/S Mobilization**
- Side-lying
- Knees/hips flexed at least 90°
- Neutral spine.
- Palm on forehead
- Rotate through upper back
- Lead w/elbow, look into stretch w/eyes. Breathe.

**Self T/S Mobilization – Bow & Arrow**

**Self T/S Mobilization/pec/lat stretch**

**NUTATION**
- Movement of sacrum between ilia and L5, involving anterior nodding motion of sacral base.
- Innominates will move posteriorly (relatively).
- Associated with an extended lumbar spine.

**NUTATION**
- Loads interosseous and sacrotuberous ligaments.
- Increase SIJ compression.
- Synonymous with stability (heel strike), and increased lordosis.
Nutation

Movement of sacrum between the ilia and L5, in a posterior direction.

Innominates will move anteriorly (relatively).

Associated with a flexed lumbar spine.

Counter Nutation

- Loads long dorsal sacral ligament.
- SIJ instability, increased motion, and loss of lordosis or flat back.
- Sitting.

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Counter Nutation

- Loads long dorsal sacral ligament.
- SIJ instability, increased motion, and loss of lordosis or flat back.
- Sitting.
This is doctor and patient placement for the seated palpation for nutation. The doctor’s hand is on the upper part of the sacrum and the doctor brings the patient into extension while palpating in a P-A direction.

This is the doctor and patient placement to motion palpate the sacrum in counter nutation. The patient is flexed forward and the doctor palpates from P-A and S-I on the lower part of the sacrum.

Perfect side posture patient positioning.  
- Hip flexion angle ~ 45º.  
- Dr. stands oblique to the table, stance foot placed at the level of the contact plus a bit cephalad, with ankle dorsi-flexed.  
- Patient’s pelvis is rolled forward until the patient is under the doctor’s center...see your contact!  
- Place contact on upper part of sacrum, Roll patient into your home (bring your work under you).  Contrast contact under sternum, DO NOT REACH FOR PATIENT.  
- ’Gently’ make a snowball...this will tuck elbow in and protect shoulder.  
- Have patient “drop belly to floor” to initiate nutation.  
- Drop and slight thrust on impact with the patient.

Nutation - Kick Push  
- Same set-up rules for drop  
- Kick and push happen a split second apart.

Counter Nutation  
- Broad forearm contact.  
- Stay close.  
- Create some CN with tissue pull (“lat squeeze”).

Nutation - Side Posture - Drop  
- Perfect patient positioning.  
- Doctor stands perpendicular to table, knee at level of ASIS.  
- Knee rests against edge of table with ankle dorsi-flexed.  
- Patient’s pelvis is perpendicular to the table top.  
- Supportive hand placed on back of patients hand.  
- Doctor places her knee at patient’s ischial tuberosity/dorsum of foot against patient’s patella.  
- Stay light. No pre-stress with leg.  
- Take contact...slight tissue pressure.  
- Adductor squeeze/”Thigh Master” = control.  
- Kick & thrust simultaneously.
Counter Nutation – Kick Pull

- Perfect Side Posture Position.
- Hip Flexion angle is increased to at least 90º.
- Patient’s torso is rotated until the lordosis is decreased.
- Doctor’s knee at the level of the ASIS standing perpendicular to the table.
- Patient’s pelvis is perpendicular to the table top.
- Contact broad surface of sacrum with fleshy forearm.
- Slight Tissue pressure toward the apex of the sacrum.
- Kick & Thrust Simultaneously.

Sacroiliac Joint Manipulative Procedures
Sacroiliac C-nutation - Side Posture - Drop

- Perfect Side Posture Position.
- Hip Flexion angle is increased to at least 90º.
- Doctor’s knee at the level of the contact plus 2” standing parallel/oblique to the table.
- Contact apex of sacrum with palm/fleshy forearm with the elbow out.
- Bring the elbow into your side as you scoop the sacrum under creating counter nutation tension.
- Drop.

Patient Prone on drop type table or two toggle boards
Contact is broad gentle contact over sacrum below S2
Straight arm thrust powered by a slight drop

Patient prone in hyperextension on drop type table or two toggle boards
Contact is Sacral base above S2
Straight arm thrust down on contact powered by a slight drop

The Lumbar Spine

- Much debate over what really happens in the L-spine.
- Flexion and extension patterns can change depending on patient task and pain. When performing lumbar flexion twice some subjects use different movement sequences each time (Pearcey 1999).
- Lateral flexion is highly complex and usually involves lateral bending and rotary movements of the interbody joints and variety of movements at the Z-joints (Bogduk 1997).
- The general pattern is for lateral flexion to be accompanied with contra-lateral axial rotation in the upper L-spine and ipsi-lateral rotation at L5/Si (Pearcey & Tibrewal 1984).
- Others have found the opposite with L5/Si being variable.

Movements of the Lumbar Spine

- Extension (ASG)
- Flexion
- Lateral Flexion
- Rotation (minimal)
Lumbar Spine Palpation L1-5

Hyperextension

Lumbar Spine Movement Analysis

Lat flex & Rot

Flex/Ext

Lumbar Spine Adjusting

- You must be on a fixation for it to work.
- Set up is crucial.
- Lumbar adjusting is no harder than anywhere else on the spine.
- To pull or to push.
- Make sure your palpation and adjustment are the same.

Lumbar Joints (L5-L1) Manipulative Procedures

Side Posture - Drop

- Perfect Side Posture Position
- Doctor's knee at the level of the contact plus 2” standing oblique to the table
- Patient’s pelvis is rolled forward on the table top until the patient is under the doctor’s center
- Hip Flexion angle = 45º
- Place contact at level of restriction
- Drop and slight thrust on impact with the patient

Side Posture TL Lateral Flexion/Rotation

- Contact: Soft Pisiform
- Contact: Bent Finger/Tips of 3rd & 4th Fingers

Bottom Leg Extended... Kick or Drop.

Side Posture TL - Extension

Hip Flexion Angle less than 90º
Side Posture TL - Flexion

- Same patient set-up as CNUT of the sacrum.
- Contact: cupped hand (not the forearm).
- Patient's top leg at 90 degrees of flexion or greater.
- Can DROP or KICK.
- Drop/Kick & Thrust simultaneously pulling caudally.

Side Posture TL Kick Pull
Lateral Flexion/Rotation

- Perfect Side Posture Position
- Hip Flexion angle = 45°
- Patient's knee at the level of the contact plus 2” standing oblique to the table
- Patient's pelvis is rolled forward on the table top until the patient is under the doctor's center
- Kick & Thrust simultaneously

Lumbar Joints (L5-L1) Manipulative Procedures
Side Posture – Leg Assist Kick Push

- Perfect Side Posture Position
- Hip Flexion angle = 45°
- Doctor's knee at the level of the contact plus 2” standing oblique to the table
- Patient's pelvis is rolled forward on the table top until the patient is under the doctor's center
- Contact level of restriction
- Kick and thrust simultaneously

Adjustment

SI Joint Adjustment
Side Posture – Leg Assist Kick Push

- Perfect Side Posture Position
- Doctor's knee at the level of the contact plus 2” standing oblique to the table
- Patient's pelvis is rolled forward on the table top until the patient is under the doctor's center
- Hip Flexion angle = 45°
- Contact SIJ with palm/hypothenar
- Slight Tissue pressure toward the patient's nose
- Kick & Thrust Simultaneously
- The straight push shown in the bottom picture is performed without a kick on smaller patients or typically by larger / stronger doctor’s.

SI Joint Adjustment
Nutation - Side Posture - Leg-Assist Kick Push

- Perfect Side Posture Position
- Hip Flexion angle = 45°
- Doctor's knee at the level of the contact plus 2” standing oblique to the table
- Patient's pelvis is perpendicular to the table top
- Contact above S2 on sacrum with broad palm/calcaneal contact or forearm/elbow
- Have patient initiate nutation by dropping belly to floor.
- Kick & Thrust simultaneously pushing the sacrum P to A

Lumbar Joints (L5-L1) Manipulative Procedures
Flexion - Side Posture - Leg Assist

- Perfect Side Posture Position
- Hip Flexion angle = 45°
- Patient’s torso is rotated until the lordosis is decreased
- Doctor's knee at the level of the ASIS standing perpendicular to the table
- Patient's pelvis is perpendicular to the table top
- Contact is on either side of the spinous with the 2nd & 3rd digits
- Kick & Thrust simultaneously pulling caudally
**Thoracolumbar Manipulative Procedures**

Flexion – Supine
- Patient supine
- Doctor parallel & close to table
- Hip to hip and close to patient
- Doctor secures patient’s cervical spine with ipsilateral hand & forearm
- Lift patient to the side
- Make contact with spinous placed in closed fist
- Tissue pull cephalad
- Compression step - see demo
- Roll patient over contact and doctor translates over ankle mortice into dorsiflexion
- Drop

Extension – Supine
- Patient supine
- Doctor parallel & close to table
- Hip to hip and close to patient
- Doctor secures patient’s cervical spine with contralateral hand
- Lift patient – see demo
- Make contact with spinous placed in closed fist
- Tissue pull cephalad
- Roll patient over contact and doctor translates over ankle mortice into dorsiflexion
- Drop

**Mobilization**
- Utilizes muscle energy. Good mobilization to unlock the lumbar spine.

Resist external rotation of the arm and ER of the top leg (like a clam exercise).

**SHORT ANSWER…YES.**

- **3 Groups:** Placebo, Maintained SMT, No Maintained SMT.
- **SMT** or sham manipulation for 1 month all groups.
- **Ongoing SMT** every 2 wks for additional 9 months for Maintained SMT group.
- **Results:** All groups improved, however, Maintained SMT group had better results re: post treatment and pain disability as well as improved lumbar mobility and perceptions of their general health than the No Maintained SMT group.
- **Some Limitations:** As with many studies but overall promising findings.

**Distribution of cavitations as identified with accelerometry during lumbar spinal manipulation. Cramer GD, Koo JK, Raja PK et al. Journal of Manipulative & Physiological Therapeutics 2011; 34: 572-583.**

- **JOINTS OF SMT GROUP CAVITATED MORE THAN NON SMT GROUP.**
- **UPSIDE JOINTS (CONTACT SIDE) CAVITATED MORE FREQUENTLY THAN DOWNSIDE JOINTS.**
- **JOINTS IN TARGET AREA CAVITATED MORE THAN THOSE OUTSIDE TARGET AREA.**
- **FINDINGS NOT SURPRISING BUT STILL IMPORTANT TO VALIDATE WHAT WE THINK WE ALREADY KNOW.**

**Does maintained spinal manipulation therapy for chronic non-specific low back pain result in better long term outcome? Senna M & Machaly S. Spine 2011; 36(18): 1427-37.**

- **Distribution of cavitations as identified with accelerometry during lumbar spinal manipulation. Cramer GD, Koo JK, Raja PK et al. Journal of Manipulative & Physiological Therapeutics 2011; 34: 572-583.**

- **Short answer...Yes.**

- **3 Groups:** Placebo, Maintained SMT, No Maintained SMT.

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- **Results:** All groups improved, however, Maintained SMT group had better results re: post treatment and pain disability as well as improved lumbar mobility and perceptions of their general health than the No Maintained SMT group.

- **Some Limitations:** As with many studies but overall promising findings.
**Generalized Lumbo-Sacral Side Posture Manipulation...MRI Pre and Post SMT to Assess Joint Gapping.**

- Greater gapping of facet joints that received SMT than those that did not (L4-5/L5-S1).
- Greater gapping of joints that cavitated than those that did not.
- Cavitation occurred in adjacent areas in 2 subjects...are we as accurate/specific as we think...does it matter?

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**Clinical Pearl for Motion Analysis of Occiput-Atlas**

- No doubt the major motion is flexion and extension at this complex; however, assessment of side-bending using lateral translation can be used diagnostically. (Bourdillon, 2002)
- Often it is easier to assess this than flexion and extension (Bourdillon, 2002)
- Any loss of side-bending motion is critical and restricts flexion and extension (Bourdillon, 2002)
- Just like a drawer that no longer glides in and out if there is loss of side-to-side freedom.
- Dysfunction causes occipital pain, HA, pain behind eye.

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**Occiput-Atlas**

- Axial rotation and lateral flexion of the occiput require one or both occipital condyles to rise out of their atlantal sockets - distracting the joint (Bogduk, 2002)

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**LF and Flexion & Extension at the Atlanto-Occipital Joint (Kapandji 185)**

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**Flexion & Extension of Occiput-Atlas Joint**

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**Occiput - Atlas Palpation**

Coupled Lateral Flexion & Contralateral Rotation
**Occiput – Atlas Adjustment**

**Coupled Lateral Flexion & Contralateral Rotation**

1. Supine, head piece elevated
2. Supportive Hand cups posterior cervical spine
3. Contact Hand – Mastoid
4. Rotate 45 degrees away
5. Create Lateral Flexion with translation
6. Thrust – Straight across

**Preparation:**
- Zephyroid Height
- Supportive Hand on Zygomatic
- Contact Hand – Mastoid
- Return to Neutral
- Allow Lateral Flexion
- Return nose to midline

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**Seated Occiput Lift**

Dr. stands behind patient. Patient seated at xiphoid height. Patient’s head is rotated fully, but comfortably toward the left (for a right-sided occiput lift). Dr’s left hypothenar/PIP of 3rd finger cups under the patient’s right mastoid process and allows slight lateral flexion of the patient’s head over the contact. Dr. reinforces the contact with his right hand and traction upward. The thrust is a quick, short lift and scoop. NO ROTATION WITH THRUST. WATCH THE TMJ!

This adjustment is NOT for everyone.

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**Occiput – Atlas Palpation**

**Flexion**

8-10 Degrees of Flexion

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**Occiput – Atlas “Adjustment” (Seated)**

**Flexion**

8-10 Degrees of Flexion

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**Occiput-Atlas “Adjustment” (Supine)**

This is doctor and patient placement for anterior to posterior glide of the occiput on the atlas using the speeder board. The doctor’s left hand is tractioning from an inferior to superior direction on the occiput while the doctor’s right hand pushes from anterior to posterior on the forehead being careful of the patient’s eyes and nose.
Muscular Treatment – Suboccipital PIR

Dr. tractions occiput superiorly w/right hand, stabilize head w/left hand—have pt. look up w/eyes, take deep breath in, hold 3 sec.—pt. exhales, looks down w/eyes. WAIT—unmove to next barrier by depressing head with hand on forehead maintain superior traction. Repeat until no release/movement is detected.

PALPATION

First Rib

Placement for palpation of right first rib. Dr’s right fingers go behind right clavicle in the “gutter”. Dr. passively take pt’s head into ext/right lat flex/contralateral rotation and feels the 1st rib drop away from Dr’s fingers.

ADJUSTMENT

First Rib

- Contact hand is supinated w/wrist in neutral/slight extension.
- Reinforced index/web contact.
- Set contact where upper trap meets neck.
- Not a “bony” contact...vague...trust what tissue lives under your hand.
- Trap sits between thumb and index finger.
- Thrust lateral to medial.
  - NB adjustment for patients w/TOS, aberrant breathing patterns.

ADJUSTMENT

First Rib

PALPATION/MOBILIZATION

First Rib

This is doctor and patient positioning for motion palpation or mobilization of the left 1st rib. The patient’s right arm is placed on the doctor’s right knee. The patient is laterally flexed to the left and the doctor joint plays or mobilizes with his left hand while the right hand simply stabilizes.

Costovertebral Joint (Rib)

- Can be palpated seated/supine.
- Very painful when restricted. Usually point tender.
- Patient will tell you when you’re on the right joint.
- Often described as a sharp/grabbing pain...“my rib is out”.
- Typically pain on deep inspiration or w/coughing.
- Possible referred pain (wraps around/shoots through to chest, possibly arm)
- Patient may report hx of respiratory issue.
- Common restriction...is it the primary?
- Recurrent rib restrictions...consider postural strain, poor stabilization/respiratory pattern, etc.
Costovertebral Palpation

**RIB DYSFUNCTION**

**Adjustment**

**Costovertebral Joint**

**Thoracic Outlet Syndrome**

- Wright's Test, Adson's Sign, Costoclavicular maneuver.
- Address scalenes, pec minor, axilla.
  - Muscular release techniques can be very effective.
  - Self-stretching necessary.
  - Ergonomics/postural correction a must.
  - Cervical ribs?
  - Stubborn cases...consider neurodiagnostic testing.

Respiration Rehab – Supine

- Patient must first understand what “ideal” respiratory pattern is.
- Self-check is important.
- Breath into lower abdomen/pelvis.
- Rib cage stays in caudal position
- No elevation of clavicles or activation of neck muscles.

**Challenges:**
- Tighten a resistance band around the lower part of the ribs.
- Breath into the band in all directions with no movement of the chest.

Respiration/Trunk Rehab – Basics

- Patient must first understand what “ideal” respiratory pattern is. You may need to assist w/passive pressure.
- Self-check is important (palpate at ASIS/groin)...HUG.
- Breath into lower abdomen/pelvis.
- Rib cage stays in caudal position.
- Thorax/rib cage expands anteriorly, laterally, posteriorly (use foam ball/socks for facilitation).
- No elevation of clavicles or activation of neck muscles.
- Maintenance of the cylinder is paramount for stability.
- Can train in any position (seated is typically most difficult).
- Add phasic movements/resistance/tri-planar movement as patient is able.

Respiration Rehab - Seated

- With shoulders relaxed and elbows bent to 90°, push forearms down into arm rests of chair.
- Breath into lower abdomen/pelvis.
- Rib cage stays in caudal position
- No elevation of clavicles or activation of neck muscles.
- Perform as a micro-break several times throughout the day when seated for prolonged periods (i.e. 3-5 deep breaths every 20-30 minutes).
Karel Lewitt

“I am always aware of how many things which I taught in my long past have since been proved wrong. The most important attitude is therefore to be constantly aware that what you are doing and teaching now you will have to modify and correct in view of new facts. Thus you must keep an open mind for new knowledge, even if it sometimes shows that what you believed and taught before was wrong.”