Rehabilitative Management of Cervical and Temporomandibular Disorders

Presented by
James W. George, DC

Knowledge Objectives:

1) To learn kinetic links for cervicocranial and mandibular locomotor system.

2) To learn pain presentations for musculoskeletal conditions of the head, neck and jaw.

3) Learn the appropriate role for dental intervention and coordination of care.

4) To distinguish TMJD from muscle imbalance and myofascial.

5) To learn basic occlusal and dental knowledge for establishing and initiating dental and paradental relationships.

6) To understand Biopsychosocial model as it relates to TMD and neck disorders.

7) Learn to integrate spinal stabilization strategies for neck and jaw disorders.

1) How to screen for temporomandibular functional pathology and structural derangement

2) How to simplify palpatory assessment of the temporomandibular joint

3) How to mobilize the temporomandibular joint

4) Manual resistance techniques for key muscles of mastication.
5) Manual resistance techniques for key muscles of the cervical/thoracic spine.

6) Endurance exercises for neck and jaw disorders

7) Clinical decision making for neck and jaw disorders
David Butler

“Each profession or group presumably has something to offer and surely they can’t all be correct. Somehow we need to extract what is common and beneficial from the various groups.”
What defines Activity Tolerance?

Current Conditions for TMJ Eval and Tx


Statement One

- “TMD is currently associated with dentistry; however research indicates TMD to be a complex medical condition, best served through an interdisciplinary medical home. Currently, neither physicians nor dentists are effectively trained to address TMD. As a result there are no scientifically based standards of care or best practices”. 
Statement Two

• “The safety and effectiveness of any of the more than 50 treatments currently prescribed are unknown and in some cases can lead to iatrogenic complications that worsen the condition”.

Statement Three

• “TMD and its overlapping pain conditions are stigmatized and patients, mostly female, are often not taken seriously”.

Statement Four

• “The research, whether epidemiologic, basic, clinical or translational has been compartmentalized, focusing largely on the end organ affected. This has greatly hampered the sharing of diagnostic approaches and collaborative research which might lead to fresh insights into mechanisms and potential therapies”.

How would you define your rehabilitative approach?

“to identify the tension related to the pain generator, reduce the tension and teach the patient how to keep the tension from returning.”
What is the biopsychosocial model?

“Most pain syndromes, especially sub-acute or chronic cases, involve biologic (structural and functional), psychological and social factors.”

Your Tx + pt. behavior = outcome

How do we achieve the goals of our examination?

- History
- Posture assessment
- Functional assessment
  - movement and endurance tests
  - length and neural tests
  - palpatory assessment
- ID pain generator
- ID Overloading Mechanism
- ID Kinetic Linkage

What is the most efficient treatment for this patient?

- Patient-centered care

How do you know when your patient is better?

- decreased pain
- decreased activity limitations
- decreased mechanical sensitivities
- improved performance
- achievement of mutual goals
Epidemiology

- General population - 483 subjects
  - 38% neck pain
  - 55% TMD

- TMD 25% general population

- 385 12-16yr old children
  - 21% at least one sign of TMD
  - 33% reported symptoms

Epidemiology

- More common in women vs men
- Condition seen more in adolescence or early twenties vs older age
- TMD generally gets somewhat better with time and conservative approach is supported
  - Okeson JP. 2005 Clinical Mang Orofacial Pain

Etiology/Treatment?

- “Diagnostic classifications for TMD are flawed…… etiology unknown, no consensus on what or when to treat, no therapies proven efficacious.”

- National Institutes of Heath (NIH) Technology Assessment Conference 1996

Background

- Joint sounds or deviations with mouth opening occur in approx. 50% of non-symptomatic individuals
  - Wabeke et al. University Amsterdam

- However, mouth opening limitations are rare, occurring in less than 5% of non-symptomatic patients
Background

- Rasmussen found most cases of clicking do not progress to locking.
- Most cases of acute painful and disabling symptoms subsided in time

Background

- Patients with mean age range of 52 years presented with TMJ crepitus
- Patients with mean age of 38 years did not
  - 128 Finish adults over 9 years showed incidence of clicking increased with age

Background

- Asymptomatic volunteers with ADD 2X pain in other jts
  - Symptomatic w/o ADD 3-4X incr pain in other jt. pblms
  - Symptomatic w/ ADD 2X family affected by TMD

Background: TMD Treatment

- 85 patients with ADD via MRI
- 4 tx groups
  - Splint therapy
  - Pumping manipulation
  - Arthrocentesis group
  - Arthroscopic surgery group

TMD Treatment - Ohnuki

- No significant improvement in Disc displacement with any tx.
- ROM and VAS was improved in all groups
- Morphology of disc worsened in arthrocentesis and surgery group

Splint Therapy RCT

- 200 subjects
- Traditional Splint, Intra oral splint and self care
- No significant differences, all patients improved


Occlusion and TMD?

- In adult subjects, malocclusion findings show similar prevalence irrespective of the presence of any specific pain-related TMD condition.
- Based on the above, general practitioners should note that occlusal features may not be considered a discriminant factor for TMD.
- Manfredini D. Quintessence Int 2014

Occlusion and TMD

- “There is no definitive relationship between malocclusion and TMD. Occlusal findings in TMD studies are commonly found in symptom-free populations.”
**PT Interventions for TMD**

- Systematic Review
- 12 of 36 articles met inclusion
- 4 posture/exercise training
- 2 acupuncture
- 6 electrical modalities

  - *Medlicott, M. Physical Therapy 2006*

**Posture Training plus Behavioral Therapy**

- ADL training (sitting, standing etc.)
- Education regarding tension in jaw muscles being responsive to improved head posture


**Laser/TMJ outcomes**

- Improvement in pain both short term (24 hours) and long term (180 days).

  - *Pereira TS. Cranio 2014 32(1) 51-6*

**Acupuncture**

- Dry needling is effective in relieving the pain from trigger points in TMJ muscles
- Acupuncture can benefit patients with jaw muscle tenderness
Acupuncture

- Okeson cites 8 studies showing successful outcomes with TMD symptoms.
- One study showed acupuncture as effective as an occlusal splint.

Head and Cervical Posture and TMD

- Systematic Review
- 12 articles accepted for review
- Poor methodological quality
- Olivo SA, J Orofacial Pain 2006

Head Posture

- More neck pain subjects had higher degrees of forward head posture greater neck pain disability.
Chronic Neck Pain and Posture

- CNP patients showed inability compared to controls to maintain neutral head posture during computer task.
- 2 exercise groups improved pain/disability
- Cranio-cervical training improved posture control ability
- Falla D, et al Phys Ther vol.87, No.4 April 2007

Masticatory Dysfunction

- Mouth opening and masseter TrP responded significantly to hamstring post-isometric stretch

Fernandez-de-las-Perías, C. J of Musc Pain, Vol. 14 (3) 2006

- **Primary Functions of the Mandibular Locomotor System:**
  - Mastication
  - Swallowing
  - Speech

- **Secondary Functions:**
  - Respiration
  - Emotional expression
Muscles of Mastication

- **Muscles of Elevation of the mandible:**
  - Masseter
  - Temporalis
  - Medial Pterygoid
Muscles that open the jaw

- Superior lateral pterygoid
  - 60% attachment to neck of condyle
  - 40% attachment to disc
  - Active with elevator muscles
  - Important activity during power stroke of chewing and teeth closure
• The superior lateral pterygoid and the superior retrodiscal lamina act as guide wires in positioning the disc to optimum positions in relation to interarticular pressure. It is, however, the morphology of the disc itself and the interarticular pressure that most greatly affect the function of the disc.

TMJ BIOMECHANICS AND ANATOMY

• Ginglymoarthrodial joint
  Complex four-joint system:
  (2) inferior joint systems - condyle-disc complex
  (2) superior joint systems - condyle-disc complex functioning against surface of temporal fossa

Figure 1. Drawing illustrates the anatomy of the TMJ: 1 = condyle; 2 = temporal bone, articular eminence; 3 = temporal bone, mandibular fossa; 4 = disk, anterior band; 5 = disk, intermediate zone; 6 = disk, posterior band; 7 = superior retrodiskal layer; 8 = inferior retrodiskal layer; 9 = vascular-nervous structures; 10 = capsular superior attachment; 11 = capsular inferior attachment; 12 = superior joint space; 13 = inferior joint space; 14 = superior head of the lateral pterygoid muscle (LPM); 15 = inferior head of the LPM; 16 = interpterygoid space; 17 = external auditory canal.

Fig. 1-15. Temporomandibular joint (anterior view). The following are identified: AD, articular disc; SC, sigmoid notch; IC, internal capsule; LDL, lateral pterygoid muscle; CL, condylar head; MDL, masseter muscle; LP, lateral pterygoid muscle.
• Oblique - TM Ligament
  • resists excessive dropping of condyle
  • controls rotational movement of mandible
• Inner - TM Ligament
  • limits posterior movement of condyle
  • very strong - protects lateral pterygoid
Cervicocranial Kinematics and Muscle Relationships

Background

- Glutamate-induced jaw muscle pain caused 700% increase in neck muscle activity. (Svensson et al. Pain, 2004)

Jaw “Clenching” linked to:

- Increased masticatory muscle activation and pain
- Increased neck muscle activation
- Increased trunk muscle activation


Orofacial activation referenced as “rest position.” Typically, this involves tongue up in the roof of the mouth, lips together and teeth apart.

Rugh JD. J Prosthetic Dentistry 1981
Carlson CR. J Orofacial Pain 1997
Orofacial Activation used for Performance Enhancement

- Additionally is often used for performance enhancement during exercise and training.

Neck Flexion Test (Janda) - Research with McGill

- Three conditions for tongue assisted orofacial activation were randomly assigned.
- No command – relaxed
- Light Orofacial (LO) “rest position” tongue up, lips together, teeth apart
- Forceful Orofacial (FO) tongue forceful, lips pursed, teeth apart

Methods
Results

- Orofacial activations did not significantly change muscle activations during a neck endurance test ($p > .05$)

Additional data 5 women, 5 men
JR Gray, CD Skaggs and SM McGill.
Canadian Spinal Biomechanics Society 2004 (abstract)

Deep Neck Flexors correlated with pain and co-contraction for neck stabilization tasks. (Falla D, Jull G, Hodges P. Experimental Brain Research 2004)

Conclusions

- Orofacial activations do not alter neck muscle activation during an endurance test.
- SHM likely has a significant role in neck flexion and should be considered when evaluating and treating neck conditions.
Trigeminal-Cervical Pain Pathways
Trigeminal Cervical Crossover

- Trigeminal stimulation (infraorbital n.) reflexively activates head extension via splenius capitis and SCM.


TCN Crossover

- Stimulation of chemosensitive receptors in the TMJ increased sensitivity, effecting coordination and stiffness regulation for the neck.


- “The clinical phenomenon of sensory, motor, and autonomic effects resulting from deep pain input are important because referral of pain from the cervical region is common and easily mistaken for masticatory pain.”

Okeson JP, Orofacial Pain Guidelines, 1996
Psychosocial/Pain Behavior

Predictors of Outcome For Treatment of TMD(chronic)
- low self esteem
- level of sleep
- low energy
- feeling worried


Psychosocial

• Pain Behavior
  – biting lip
  – jaw movements
  – rubbing pain/muscles
  – stretching
  – self-manipulations

Self-efficacy

• TMD patients with greater self-efficacy showed better psychosocial adaptation and decreased disability.

Mindfulness

- Behavior patterns that were “mindful” significantly predicted physical, social, emotional functioning.............as well as pain medication use in chronic pain patients


Kraus, F.W.
American J Orthodontics and Oral Surg 1943

- Determine primary muscles and confine attention to these.
- Ensure the cooperation of the patient
- Avoid exercises which may produce unnatural habits or movements
- Avoid overstressing or fatiguing muscles to a state of staleness

DENTITION – RELATIONSHIPS AND DEFINITIONS

Relationships of the posterior teeth

- Bucco-lingual arch relationship - - cross-bite assessment
- Molar classification
  Class I - Class II - Class III -

Normal buccolingual relationship

Fig. 3–12. Normal buccolingual arch relationship: Note that the mandibular buccal cusps occlude in the central fossae of the maxillary teeth and the maxillary lingual cusps occlude in the central fossae of the mandibular teeth.
Bilateral Cross-bite

Class I molar relationship

Class II molar relationship

Class III molar relationship
Relationships of the anterior teeth

Class I -  
Class II; division 1  
Class II; division 2  
Class III - open bite

Definitions

Lingual - Pertaining to or towards the tongue.
Labia - Pertaining to or towards the lip.
Buccal - Pertaining to or towards the cheek.
Occlusion - The act or process of closure or of being closed or shut off. The static relationship between the incising or masticatory surfaces of the maxillary or mandibular teeth or tooth analogues.
Overbite - Vertical overlap of the anterior teeth.
Overjet - Horizontal overlap of the anterior teeth.
Vertical Dimension of Occlusion - The distance between the maxilla and mandible that supports the vertical facial height

ORTHOPEDIC APPLIANCES

- Splints, orthotics, orthoses, bite guards, bite planes, nightguards
- Crozat, twin block, swartz, bionator

Complications:
cavities, gingival inflammation, mouth odors, speech difficulties, occlusal changes and psychological dependence(I)
STABILIZATION APPLIANCES

- flat plane
- muscle relaxation splints

- Sixty-three pain patients were randomly assigned one of three experiment groups.
- Passive control = full splint for 30 min
- Active control = palatal splint 24 hrs/day
- Treatment group wore full splint 24 hrs a day.

- All three showed reduced pain ratings and improvement in quality of life. There were no significant differences between groups for the variables studied.


Splint Therapy RCT

- 200 subjects
- Traditional Splint, Intra oral splint and self care
- No significant differences, all patients improved


Splint Therapy - muscle reactivity

- Decreased activity in the masseter and temporalis
- Increased activity in the suprhyoid muscles

Take Home, Bottom Line…..

• Treatment is not intended to correct the disc-condyle relationship but to facilitate control of symptoms while function is restored.

Helkimo, E. Journal of Craniomandibular Practice, 1987;5:270-276

• Application of maxillary stabilization splint resulted in decreased lordosis of the upper cervical spine. Periodic evaluation of this area is suggested following splint implementation.


INVASIVE PROCEDURES
Occlusal Therapy

The scientific literature does not support the need for a two-phase treatment because definitive occlusal therapy is not required for the effective treatment of most TMD.

Just, J. Journal of the American Dental Association, 1991; 122:56-60

There is no evidence that complex occlusal therapy to provide an idealized dental occlusion is necessary for TMD or bruxism management.

McNamara, JA. Journal of Orofacial Pain, 1995; 9:73-90

Occlusion and TMD

• 50 TMJ patients
• 30 Masticatory muscle pain
• 60 controls
• No statistical difference in occlusal contacts between all groups

Occlusion

- “Occlusal interferences are common in asymptomatic people as well as in patients with TMD.”


- This study suggests that facial morphology has limited effect on maximum mandibular opening and condylar movements in normal adult females.


The American Association of Oral and Maxillofacial Surgeons criteria for TMJ surgery:

- 1) Documented imaging of TMJ internal derangement or structural disorder
- 2) Positive evidence to suggest symptoms and objective findings are a result structural disorder
- 3) Pain and/or dysfunction at the magnitude as to constitute disability to patient
- 4) Prior unsuccessful non-surgical treatment
- 5) Prior management of contributing factors that could affect surgical outcome (ie, bruxism, parafunctional habits, cervical dysfunction
- 6) Patient consent

**TMJ Arthroscopy - patient feedback**

- **Clinician:**
  - 73% > 35 mm MROM
  - 90% had no or mild pain

- **Patient:**
  - 37% rated jaw ROM satisfactory
  - 57% satisfied with pain control

- Post-op disc position did not influence outcome

*British Dent J, vol.188, no. 1 Jan 2000*
Arthroscopy in the past has been conducted on the upper joint space alone and shown to give increased mobility. However, it often increases anterior positioning of the disc and thus causes instability.


Surgical treatment of hypermobility will be unsuccessful in the long term, unless the protrusive opening habit is controlled.

Quinn, J Craniomand Pract Jan. 1995; 13:1

Prospective, randomized clinical trial found upper joint arthroscopy to be no better than physical therapy in the treatment of restricted jaw range of motion and pain due to intra-articular disease.

Stegenga, B. British Journal of Oral Maxillofacial Surgery, 1993; 31:3-14

Non-surgical rehabilitation performed as well as all surgical interventions at 10 year follow up.

Fricton J. J Oral Maxillofacial Surg. 60: 1400-1411. 2002

Diagnostic Imaging

Is MRI required to make definitive diagnosis of disc displacement?
• “MRI for the sole purpose of determining disc position is futile and should be discouraged.
• NO impact on treatment rationale.

Dijkgraaf, Journ Oral Maxillofac Surg 57:255-268

Imaging

• MRI correlated well with clinical findings of palpation and sounds. MRI unnecessary for conservative management.


Diagnostic Imaging

• MRI
• effusion present in 42% of asymptomatic joints with normal disc position.
• 71% of asymptomatic joints with disc displacement


TREATMENT APPROACH FOR ALTERED MANDIBULAR FUNCTION

• Manipulate/mobilize Cervicocranial junction
• Mobilize, and if necessary, stabilize TM joint.
• Relax, and if necessary, stretch - masseter, lateral pterygoid, digastrics and suboccipitals
• Train motor control of mandibular depressors
• Correct parafunctional habits, sitting and standing posture
Think about mandibular function when you are treating any of the following:

- Orofacial pain syndromes
- Cervicocranial dysfunction or tension-type headaches
- SCM or upper trapezius myofascial syndromes

TMJ Dysfunctional Presentations:
Disc displacement with reduction

Reproducible joint noise, usually at variable positions during opening and closing

Disc displacement without reduction:

- Sudden onset, persistent marked limited opening < 35 mm
  - Deflection to affected side in opening
  - Marked limited laterotrusion to contralateral side

- “There are more displaced diagnoses, than displaced discs”
  
  W. Solberg, UCLA Medical Center for Orofacial Disorders
• “In the majority of cases, disc displacement without reduction can be treated by conservative means.” Mongine, F. J Craniomand Pract ; Oct 1996 (14) 4

Education

• Eat with a soft diet and avoid caffeine
• Keep your tongue up, gently resting on the palate and teeth apart as the rest position of the jaw.
• Chew on both sides at the same time or alternate sides.
• Avoid oral parafunctional habits such as clenching and grinding the teeth, tensing or gum chewing.
• Avoid excessive or prolonged opening of the mouth.
• Avoid sleeping on the stomach.
• Use over the counter analgesics or nonsteroidal anti-inflammatory as needed for pain.
• Use heat or ice over tender muscles

Treatment Plan

3-5 visits manual techniques with home exercise
progress = continue
resolved = discharge
no change = orthotic
Continue successful manual therapy
Two week review
- <50% improved, refer for stabilization splint

Changing parafunctional and/or postural habits can be behavioral therapy strategies such as habit reversal. Habit reversal can be accomplished by:

1) Becoming more aware of the habit (ie, tongue thrust or mouth breathing or clenching teeth)
2) Knowing how to correct it (ie, what to do with the teeth and tongue)
3) Knowing when to correct it

These habits need to be addressed in this manner for more than six months for the change to be maintained long term.
Continuum of Care

- Key Advice: Avoid Parafunctional Habits
- Key Mobilization/Manipulation: TMJ, upper c-spine
- Key Facilitation: Suprahyoid
- Key Flexibility: Masseter, Lat. Pterygoid, Suboccipitals
- Perpetuating Factors: Clenching, FHP, poor respiration

Karel Lewit, MD

“...he who treats at site of pain is lost.”
- Find dysfunction related to pain generator
- Find chain reaction in the motor system which is “upstream” of pain generator
- Joint dysfunction is usually upstream of trigger points
- Muscle imbalance is usually upstream of recurrent joint dysfunction


Skills Workshop

- Screening Exams
  - Centric Relation Provocation Test
  - Mouth Opening Test
  - Hyoid Mobility Test
  - TMJ Mobility Assessment
  - TMJ Provocation

Centric Relation

The most functionally stable position for the condyl-disc complex. Located in the most anterior superior position of the temporal fossa.
If CRPT is negative, the window for normalization is open for training.

- “If disease/dysfunctions are present, a restored normal or near normal position and loading of discal tissue alleviate the accompanying pains.”

*McKay & Christensen, J Oral Rehabilitation 25; 731-746 (1998)*
• Because of minimal load variance on mandibular closure and little difference in closing velocity patterns in patients with internal derangement in comparison to opening velocity findings, it is suggested that opening phase may have more diagnostic value.

Kuwahara, T. Journ of Craniomand Pract 1995; 13: 2

Opening Phase

• Non-reducing disc displacement exerts more influence on opening movement than on protrusive and lateral movements. Thereby supplying more diagnostic information.


Mouth Opening Test

• Test:
  - Patient is instructed to open their mouth fully
• P/F criteria:
  - Chin protrusion
  - Decreased ROM (< 3 knuckles)
• Head extension
Hyoid mobility Test

- **Test:**
  - Patient is supine and Dr. passively moves hyoid lateral to medial until barrier is met and then springs into other hand palpating opposite side of hyoid.

- **P/F criteria:**
  - Fail if:
    - Decreased springing
    - Increased tension

*Figure 14. Faulty mouth opening test. (A) Correct (B) Incorrect. (From Liebenson C: Self-treatment of mid-thoracic dysfunction: a key link in the body axis. Part 1: overview and assessment / Body Move Ther 5:96, 2003; with permission.)*
Skill Technique
Active TMJ palpation

• Purpose:
To assess hyper and hypomobility of combined temporomandibular joints.

Practitioner is placed at head of patient facing caudally. Bilateral finger contact is placed lateral to the TMJ, slightly anterior to the tragus. During opening and closing of the mandible, the practitioner lightly palpates for symmetric and full advancement of the condyle through the fossa.

MANDIBULAR RANGE OF MOTION AND MEASUREMENTS

• Normal interincisal opening = 53-58 mm
<40 mm = restricted opening
End feel test
Lateral excursion
<8 mm = restricted
The average of maximum opening to lateral movements was found to be 4.4 to 1 ratio.

Hochstedler, J. Journ of Craniomand Pract 1996; 14: 4
3 Knuckle Test

MROM = 48-52mm

Skills Lab – Treatment

- PIR masseter
- Suprahyoid PIR
- Lateral Pterygoid PIR
- TMJ mobilization
- Mandibular depressor home exercise

SKILL TECHNIQUE

- Masseter overactivity and tightness is most commonly represented with MROM between 30-40 mm. Trigger points are commonly found and can cause heterotopic pain. Predominantly bilateral, it is usually found primary on the side of TMJ hypermobility.
Masseter: Clinical relevance

- EMG varied significantly when comparing TMJ closed lock patients to masseter contracture.


PIR Masseter

- PIR is performed with the patient lying supine. The practitioner's superior hand contacts the forehead while the inferior hand contacts the chin. With a soft traction, slack is taken up as the mandible is opened. The patient is then told to close the mandible lightly while the practitioner applies minimal resistance. The patient then inhales and opens the mouth as wide as possible, as if to yawn. The practitioner takes up the slack.(II)

Hyoid

Hyoid restriction is most often associated with unilateral increased tension of the digastrics. This is evaluated by softly shifting the hyoid from side to side. Deviation of the cartilage can usually be seen on the side of increased tension.
PIR Suprahyoids

PIR is performed with the patient supine; one hand of the practitioner resists the opening of the mouth while the thumb or finger of the other hand exerts minimal force on the hyoid on the side of increased tension or deviation. The patient is instructed to open their mouth gently, and breathe in; to hold their breath, and then to breathe out and relax. During relaxation, resistance in the digastrics will give under the practitioner’s thumb. (II)

Mandibular Exercises

• Rest position
• Rest position – forceful tongue
• Mandibular ROM - tongue assisted
• Depressor Activation
  – Passive mobilization
  – Active assisted mobilization
  – Active self-mobilization
  – isometric and concentric efforts
  – eccentric and loaded training
Training for the Mandibular Depressors

- Indication: Failed Mouth Opening, Failed Neck Flexion, Head Forward Posture, Failed Centric Relation Provocation Test (CRPT), TMJ Hypermobility, Hyoid Hypomobility
- Key muscles to facilitate: Suprahyoid
- Key overactive muscles: Masseter, Lateral Pterygoid, Suboccipitals

Troubleshooting

- Lumbo-pelvic stabilization may be required
- Connective tissue treatment may be needed for masseter, Lat. Pterygoid and Digastrics.
- Oral orthotic or Dental assisted stabilization
Mandibular Opening

- Patient is seated. Patient hand contact is on hyoid or just superior. Patient is asked to raise hyoid and/or contract muscles just superior to hyoid. Mouth should be at 1/4 opening. This process loads the condyle-disc complex in rotation. Once this is learned the patient can proceed to partial and full opening.

Peel back = Patient places tongue in roof of mouth as to make the “N” sound. Without losing contact with the roof of the mouth, the patient performs mandibular opening and closing.

Lateral Pterygoid

PIR is performed with the patient supine with mouth slightly open. The practitioner places his thumbs on the mandible from above; the patient is told to press chin gently forward against his thumbs, while breathing in; the patient then exhales, letting the chin drop back. The practitioner takes up the slack only.

Stretch then consists of the same contacts. The patient this time applies a forceful resistance of protrusion and after exhalation the practitioner applies mild stretch to the mandible.

Lateral Pterygoid: Clinical relevance

- MRI pathology of LPM correlated with clinical findings of TMD.
- Primarily hypermobility on the side of LPM pathology.

Once involved (hypomobile) side is determined, the practitioner is placed at head, on opposite side of TMJ receiving treatment. Palmar thumb contact is placed on lower molars with inferior hand and superior hand palpated joint articulation anterior to tragus.

Slack is lightly removed and barrier engaged. Barrier and release is first directed inferiorly. Then medial and lateral inferior vectors are completed. Respiration can be used to assist release. Barrier should not require or receive engagement longer than 25 seconds.
Masseter

Temporals

Digastric

Lateral Pterygoid
Cervical-Thoracic Rehabilitation

• “Since many patients present with both cervical and masticatory pain disorders the dentist will often need to work in close relationship with a proper health professional who manages the cervical pain disorder.” - Okeson, J. Orofacial Pain Guidelines, 1996

Lewit has stated that the SCM is a classic indicator for cervicocranial or orofacial dysfunction
What is the evidence for treating Cervical-Thoracic Spine Disorders?

SMT vs Meds vs HEP

• 272 individuals, 18-65, neck pain
• Tx for 12 weeks
• Pain, disability, perceived improvement, medication use, satisfaction, health status
• SMT was more effective than meds in both short and long term, exercise similar benefits to SMT

• Bronfort G. Annals Internal Med 2012

Is there evidence for treatment of cervicogenic HA?

• RCT for exercise and manipulative therapy for cervicogenic headache
• Manipulative therapy and exercise can reduce the symptoms of cervicogenic headache, and the effects are maintained.
• Jull et al. Spine 2002; 27:1835-1843
RCT Manipulation and Two Types of exercise for CNP

- Two year follow-up
- SMT delivered by experienced Chiropractic physicians
- SMT plus exercise showed better outcomes

Evans et al. Spine 27:21 2002

Strong Study for Manual Therapy

- Large randomized controlled study - patients with chronic neck pain
- Compared manual therapy, physical therapy and general practitioners.
- Manual therapy showed best outcomes
- Rec. Manual therapy first!


Deep Neck Flexor reaction time in neck pain patients

Chronic Neck Pain and Posture

- CNP patients showed inability compared to controls to maintain neutral head posture during computer task.
- 2 exercise groups improved pain/disability
- Cranio-cervical training improved posture control ability

Falla D, et al Phys Ther vol.87,No.4 April 2007
WAD – active education

- Encouragement to continue with activities of daily living (ADL’s) had a superior outcome than prescription of sick leave and immobilization.


How does fear of pain contribute to disability?

- Poor recovery and chronic pain correlates to increased Tampa Scale of Kinesiophobia scores and decreased muscle activation.
- Fear of movement correlates to disability and chronicity.


Psycho-educational video and WAD

- Patients presenting to ER with whiplash.
- Study represents the importance of patient education.

- Oliveira, A. et al Spine 2006; 31:1632-1657
X-ray

• The false positive rate for imaging in the neck is as high as 75% with the asymptomatic population


Assessment

• “In patients with neck pain, there is no difference in reported pain and disability levels between those with and those without evidence of cervical spine degeneration.”
  • Mean age of pts – 49 years old


Assessment

• A 10 year prospective study found no predictive value of degree of cervical lordosis and future
  • neck pain
  • degenerative changes

Clinical Tests of Musculoskeletal Dysfunction in Cervicogenic HA

- Manual examination of pain and dysfunction of the upper three cervical vertebra most correlative to cervicogenic HA.


Mobilization vs Manipulation

- RCT with blinded assessment outcome
- Patients with neck pain tx with either mobilization or manipulation
- Manipulation did not provide more rapid recovery from neck pain or better outcomes in terms of pain, disability or function

- Leaver AM, Jull G. Arch Phys Med 2010 vol 91

Thoracic Spine Manipulation for Neck Pain?

- Study showed a significant decrease in VAS and increase in cervical spine ROM with thoracic spine manipulation and mobilization.

- Suvannato T et al. J Phys Ther 2013 25(7)

How do we make the rehabilitation prescription for the cervical spine?

- History
- Posture assessment
- Functional assessment
  - movement and endurance tests
  - length and neural tests
  - mechanical sensitivities
  - palpatory assessment
What tests assess function of the cervico-thoracic region?

- Posture
- Head/neck flexion
- Arm abduction
- Push-up test
- Upper Thoracic Extension
- Respiration
- Orofacial

What are the usual suspects?

- Muscles that tend to be tight/overactive

Muscles that tend to be inhibited/weak?

Functional Relationships C/T

- **Painful joint** | **Faulty Posture** | **Faulty Movement**
- C/C junction | Head forward | Neck flexion
- GH | Gothic Shoulder | S/H rhythm
- Upper ribs | Rounded Shoulder | Respir/Push-up
- TMJ/HA | Chin poke | Mouth opening

- Liebenson, Skaggs, In Whiplash, Malanga/Nadler  Hanley and Belfus 2002
### Postural Findings - The big ones

- FHP
- Gothic Shoulder
- IR arms
- Winged/Abducted scapula
- Rounded/Slumped shoulders

### Posture

<table>
<thead>
<tr>
<th>Joint</th>
<th>Muscles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pnfd joint</td>
<td>Short mm, Inhib. Mm</td>
</tr>
<tr>
<td>C/C jxn</td>
<td>Suboccip, DNFs</td>
</tr>
<tr>
<td>G/H</td>
<td>Lev/Upp Trap, L/M Trap</td>
</tr>
<tr>
<td>Upp ribs</td>
<td>Pectorals, Diaphragm</td>
</tr>
<tr>
<td>TMJ</td>
<td>Masseter, Digastrics</td>
</tr>
</tbody>
</table>

*Liebenson, Skaggs IN Whiplash, Malanga/Nadler. Hanley & Belfus 2002*

### Arm Abduction Test

*Figure 9. Arm abduction test after Janda. (A) Correct. (B) Incorrect. (From Liebenson C: Self-treatment of mid-thoracic dysfunction: a key link in the body 2010. Part II: overview and assessment) J Body Move Ther 509, 2011 with permission.)*
Assessment - Tests

- Increased upper scapulae m. activity & decreased lower scapulae fixator activity during arm tasks


Head/neck flexion test

Head/neck flexion pre-position test after Jull

- supine
- Dr. tucks patients chin in
- Dr. pre-positions pt’s head 1 cm off table & asks pt to hold
- P/F criteria:
  - Failure if before 10 seconds elapses:
    - Head raises
    - Head lowers
    - Chin pokes
  - Gross initial shaking is a fail

Jull G. et al. JMPT 2008 31:525-33

Head Neck Flexion by Jull

Fig 1. The clinical application of the cervicovisceral flexion test. The patient is guided to an active progressive pressure movement on the test to feedback from the pressure sensors. The clinician monitors the movement and detects the presence of any activity in the superficial fibers.
Tough Research to Perform

Cervical Flexion vs. Craniocervical Flexion

Head Neck Flexion Test

Fig 3. Raw EMG data for the DOF, MS, 311, and L.A.A. and SCM muscles. Data are shown for a representative healthy control subject during the task of cervical flexion and craniocervical flexion. Note that in the task of craniocervical flexion there is minimal activation of more superficial cervical muscles in contrast to the cervical flexion task. 300, manuscript 311, expanded 6-119. Reproduced with permission from J Electromyogr Kinesiol 2000;10:621-628.

Fig. 16.44. Strengthening exercise for deep neck flexors and lower scapula stabilizers.
Head/Neck Retraction Training

Upper trap PIR

Levator Scapula PIR
Treatment approach for altered head/neck flexion:

- adjust/mobilize C0-C1 and the cervicothoracic junction
- relax, and if necessary, stretch the SCM and suboccipitals
- train motor control of deep neck flexors
- **assess orofacial function**
- correct sitting posture
- lumbo-pelvic stabilization and ankle proprio-sensory protocols

Thank You

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