



# Snap, Crackle...No Pop: Treating Non-Traumatic Neck Pain in the Athletic Population without Manipulations

**Kari (Odland) Wolf DAT, AT**  
Clinical Faculty  
Athletic Training Program/Department of Exercise Science  
University of South Carolina  
Columbia, SC

**Dawn Andrews DAT, AT, CMP**  
Injury Prevention Specialist  
Fit For Work  
Houston, TX

# Presenter Conflict



- The views expressed in these slides and today's discussion are ours
- Our views may not be the same as the views of our employers or colleagues
- Participants must use discretion when using the information contained in this presentation

# Learning Lab Objectives



**The purpose of this learning lab is to discuss Mulligan Concept thoracic SNAGs relating to improving evaluation and treatment of MNP as compared to the traditional cervical high-velocity low-amplitude (HVLA) thrusts currently employed as the standard of care**

- **Objective 1:** To discuss the Mulligan Concept “positional fault” theory when treating musculoskeletal dysfunction
- **Objective 2:** To discuss the efficacy of sustained natural apophyseal glides (SNAGs) to provide an increase in function and decrease in pain for the athletic population not suffering from traumatic cervical spine injury
- **Objective 3:** To learn Mulligan Concept thoracic sustained natural apophyseal glides (SNAGs) techniques to treat mechanical neck pain
- **Objective 4:** To integrate Mulligan Concept thoracic sustained natural apophyseal glides (SNAGs) techniques into clinical practice



- **Identifying interventions for patients within the athletic population with mechanical neck pain (MNP) has been challenging as the majority of research efforts have focused on traumatic cervical spine injuries rather than the recalcitrant clinical problem of mechanical neck pain**
  - The spine can be one of the most difficult areas of the body to both diagnose and treat (Durall, 2012)
  - Unique rehabilitation challenges for sports medicine practitioners (Weinstein, 1998; Sampsell, 2010)
  - 15% of all sports-related injuries involve the spine & 36% of all neck pain is related to mechanical neck pain (Dreisinger & Nelson, 1996; Stump & Redwood, 2012)
- **Mechanical neck pain is defined as: nonspecific pain in the area of the cervicothoracic junction without an identifiable pathoanatomical cause and most frequently requires that the pain be exacerbated by motion** (Bogduk, 1984; Bronfort, 2001; Childs et al., 2003; Cross, 2014)
- **It has been suggested that changes in cervical spine function in patients with MNP may be related to many different factors** (Elliott et al., 2006; Elliott et al., 2008)
  - Injury, Presence of Pain, General Disuse, Nerve Pathology, and Inflammatory Responses to Injury



- **High-velocity low-amplitude (HVLA) thrust manipulations are currently viewed and utilized as the “gold standard” of care in clinical practice for MNP but the efficacy of HVLA is inconsistent** (Cleland, Mintken, Carpenter, et al., 2010; Cleland, Childs, McRae, 2005; Hartman, 2001; Johansson & Sojka, 1991; Knutson, 1991; Lau, Wing Chiu & Lam, 2011; Sillevs & Cleland, 2011)
- **Despite the clinical evidence for the benefits and the apparent wide usage of HVLA, the underlying the effects of spinal manipulation are not known** (Cleland, Childs, Fritz, Whitman & Eberhart, 2007; Goodsell, Lee & Latimer 2002; Chiradejnant et al., 2002a; Hsieh et al., 2002; Sanders et al., 1990; Triano et al., 1995; Koes et al., 1993; Farrell & Twomey, 1982)
- **Studies question the accuracy and reliability of a HVLA treatment** (Edmonston & Singer, 1997; Lee, 1989; Horton, 2002; Peterson, Schmid, Leemann, Anklin, & Humphreys, 2013)



- **During HVLA thrusts, transmitted loads along the vertebral column may be different from the applied load at the specific vertebral level of application due to the effects of patient positioning and the contributions from inertial loads, loading moments, and the active and passive properties of the intervening connective and muscle tissues** (Iyer et al., 2010; Threkeld, 1992)
- **Researchers and clinicians alike theorize that disturbances in joint mobility in the upper thoracic spine may be an underlying contributor to musculoskeletal disorders in the cervical spine provide the rationale to include HVLA thrust manipulation and/or non-thrust mobilization to the thoracic spine in the treatment of patients with MNP** (Flynn, Fritz, Whitman, Wainner, Magel, Rendeiro, & Allison, 2002)
- **An alternative manual therapy intervention which poses fewer inherent risks than HVLA thrusts and are applicable to both the high school and collegiate athletic populations is the Mulligan Concept mobilization with movement (MWM)** (Wilson, 2001)

# Mulligan Concept Mobilizations with Movement



- **Mobilization with movement has evolved from the principles of manual therapy pioneers such as Kaltenborn (parallel or perpendicular to joint plane), McKenzie (gentle oscillatory movements/repeated movements), and Maitland (comparable sign) but no system of grading the force and amount of movement in MWWs**
  - Integrating concepts involving the restoration of the accessory component of physiological joint movement
  - Utilization of repeated movements with sustained positions to elicit a pattern of pain-free movement
  - Continuous evaluation and assessment
- **The overriding philosophy for utilizing MWMs is based on the presence of a “positional fault” (bony incongruence) in which mal-tracking of the joint leads to symptoms of pain, stiffness, and weakness** (Mulligan, 1999; Mulligan, 2004; Vicenzino, Paungmali, Teys, 2007)
  - Operate under the assumption that there exists ‘minor’ incongruities in bone alignment at joints
  - Hard to measure clinically
  - Presumed to have been present after a successful MWW which eliminated pain

# Mulligan Concept Mobilizations with Movement



- **The Mulligan Concept of MWM involves a sustained manual force to a motion segment while a patient performs a previously impaired action** (Mulligan, 1993; Vicenzino et al., 2007)
- **Mulligan Concept MWMs are guided towards correcting physiological tracking with the primary goal of increasing Pain-free movement which is ImmEDIATE upon application of treatment intervention and ending with a Long-Lasting effect on symptoms, which is referred to as the *PILL* concept** (Hubbard, Hertel, Sherbondy, 2006; Mulligan, 1999; Mulligan, 2004; Vicenzino, et al., 2007)
- **A cervical, thoracic, or lumbar MWM combining a sustained facet glide is referenced as a sustained natural apophyseal glide (SNAG), which is performed with the spine under normal conditions of load-bearing** (Edmondston & Singer, 1997; Mulligan, 1993; Mulligan, 2010)



# Mulligan Concept Mobilizations with Movement



- **SNAGs technique combine elements of active and passive physiological movements with accessory glides along the zygapophyseal joint plane** (Exelby, 2002)
- **The advantages of SNAGs allow** (Edmonston & Singer, 1997; Horton, 2002; Miller et al., 1999; Moutzouri et al, 2008)
  - The clinician to directly address the painfully restricted movement, even in the acute stage, by using a movement that would normally increase the patient's symptoms but are now pain-free
  - Facilitation of the correct physiological motion in weight-bearing minimizing non-physiological motion and compression of the spine
- **Mulligan proposes that these spinal techniques improve signs and symptoms by directly facilitating the restricted mobility of the facet joints and simultaneously influencing the mobility of the intervertebral joint** (Konstantinou, 2017)

# Mulligan Concept Mobilizations with Movement



- **The use of SNAGs is recommended as a suitable manual technique for treatment of patients with MNP as the neurophysiological effects of SNAGs such as immediate hypoalgesia and an increase in pressure pain thresholds have been identified** (Fernandez-de-las-Penas et al., 2007a; Fernandez-de-las-Penas et al., 2007b; Hearn and Rivett, 2002; Mulligan, 1999)

# Mulligan Concept Mobilizations with Movement



## ■ What Does the Research Say?

### ○ MWMs

#### ■ Research has established the effectiveness of MWM's

- (Collins et al., 2004; De Santis & Hasson, 2006; Exelby, 1996; Mulligan, 2004; Paungmali et al., 2003; Teys et al., 2008; Vicenzino et al., 2007)

#### ■ Long-lasting effects have been investigated via follow-up assessments in nine MWM studies

- (Hing, Bigelow & Bremner, 2007)

#### ■ MWMs are more effective if pain is the most prominent factor for the patient versus Maitland mobilizations

- (Naik, Chitra, and Khatri, 2007)

# Mulligan Concept Mobilizations with Movement



## ■ What Does the Research Say?

### ○ SNAGs

- **Clinical improvement after one treatment session may indicate that intervention within 24 hours of onset of symptoms may result in greater reduction of symptoms**
  - (Andrews, Wolf-Odland, May & Dinkins, in press)
- **A “significant difference” in range of motion in flexion, extension as patients reported a 95% improvement**
  - (El-Sodany et al., 2014)
- **Immediate clinically sustained effect in cervical pain, and disability at post-treatment, and at 6- and 12-week follow up compared to pre-treatment**
  - (Reid et al., 2008)
- **The use of the SNAG technique in the treatment of neck pain is an effective alternative to HVLA**
  - (Izquierdo-Perez et al., 2014; Leaver et al., 2010; McNair et al., 2007)

# Mulligan Concept Mobilizations with Movement



## ■ What Does the Research Say?

### ○ Positional Faults

- Follow-up MRI scans showed no change from the positional fault seen on the pre-treatment MRI scans even though there was an amelioration of pain and improvement in function

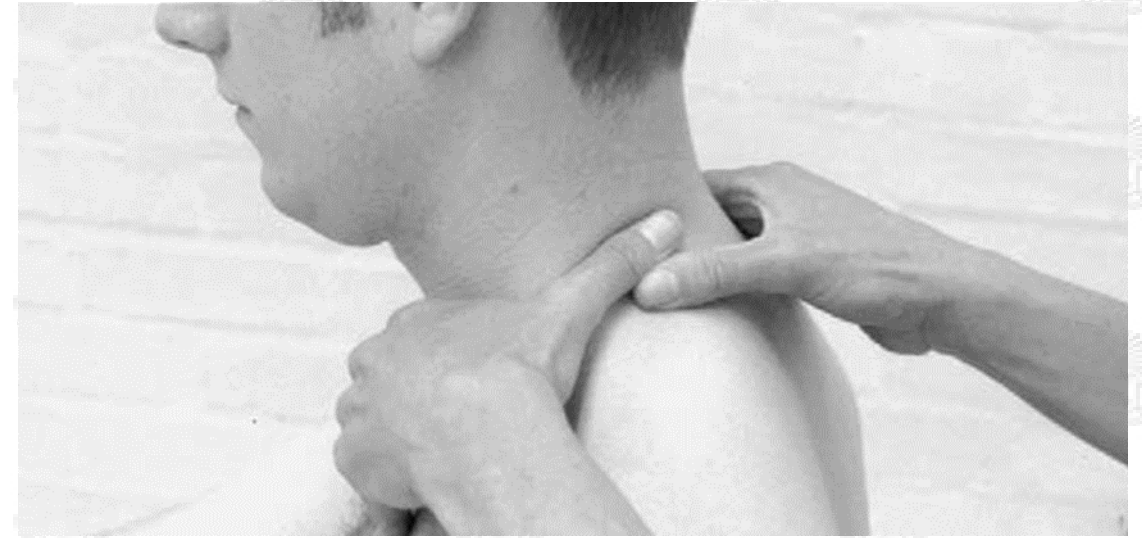
- (Hsieh et al., 2002; Hubbard & Hertel, 2008; Kavanagh, 1999)



## **Mulligan Concept Mobilizations with Movement**

### **Unilateral SNAG**


- **Best used when the patient has complaints of pain and dysfunction between C3 – C7**
- **Best used when the patient has complaints of limited active range of motion (AROM) during right or left cervical rotation**
- **Best used when the patient has complaints of pain and dysfunction on a specific side (R or L)**
- **Best used when the patient presents with non-irritation of soft tissue structures**
  - They are not the choice in conditions that are highly irritable
- **SNAGs are most successful when symptoms are provoked by a movement and are not multilevel**

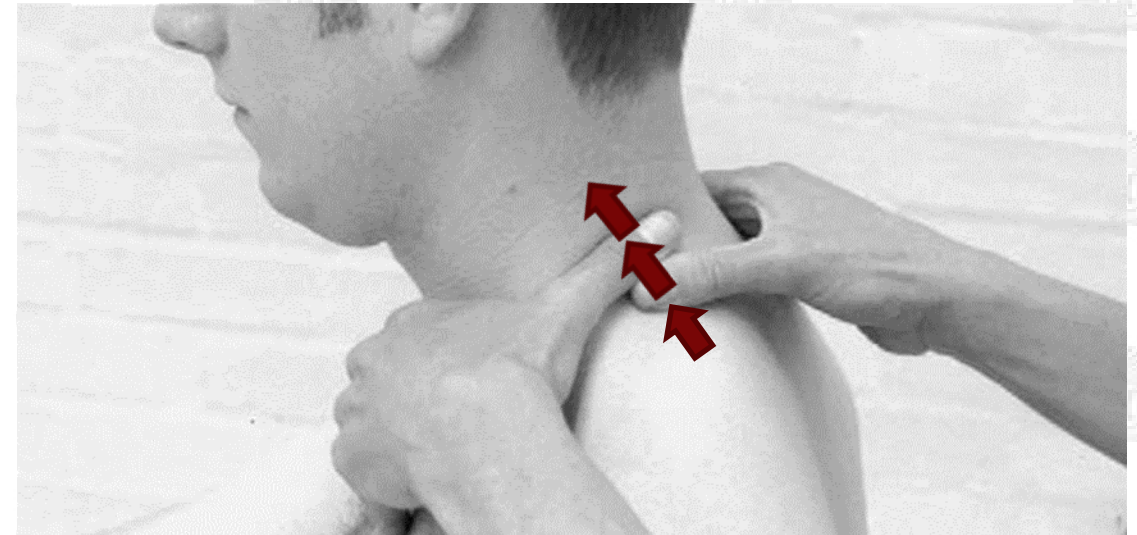




## Mulligan Concept Mobilizations with Movement

### Unilateral SNAG

- Patient will be seated with clinician standing behind
- Clinician will position their hands in a “U” shape → 
- Place the medial border of the right thumb (contact thumb) on the posterior aspect of the articular pillar of the facet below the vertebrae to be mobilized (Ipsilateral side - Treatment side)
- Take up the slack of the soft tissue to come into contact with the vertebrae to be moved
- Place the pad of the left thumb (motive thumb) perpendicular to the right thumb to reflect the cervical plane (45°)
- Apply a passive glide to the facet (glide the facet towards the eye)
- Ask the patient to perform the painful/restricted cervical rotation
- Maintain the glide as the patient performs the entire motion
- If the motion is now pain free continue with 1 set of 10 repetitions
- Reassess the patient when the treatment is completed to determine if painful motion has been fully resolved





## **Mulligan Concept Mobilizations with Movement**

### **Central SNAG**


- **Best used when the patient has complaints of pain and dysfunction between C3 – C7**
- **Best used when the patient has complaints of limited active range of motion (AROM) during cervical flexion or extension**
- **Best used when the patient has complaints of bilateral or centralized pain and dysfunction**
- **Best used when the patient presents with non-irritation of soft tissue structures**
  - They are not the choice in conditions that are highly irritable
- **SNAGs are most successful when symptoms are provoked by a movement and are not multilevel**





## Mulligan Concept Mobilizations with Movement

### Central SNAG

- Patient will be seated with clinician standing behind
- Clinician will position their hands in a “U” shape → 
- Place the medial border of your right thumb (contact thumb) on the posterior aspect of the spinous process of the facet to be mobilized
- Take up the slack of the soft tissue to come into contact with the vertebrae to be moved
- Place the pad of the left thumb (motive thumb) perpendicular to the right thumb to reflect the cervical plane (45°)
- Apply a passive glide to the facet (glide the facet towards the eye)
- Ask the patient to perform the painful/restricted cervical flexion or extension
- Maintain the glide as the patient performs the entire motion
- If the motion is now pain free continue with 1 set of 10 repetitions
- Reassess the patient when the treatment is completed to determine if painful motion has been fully resolved

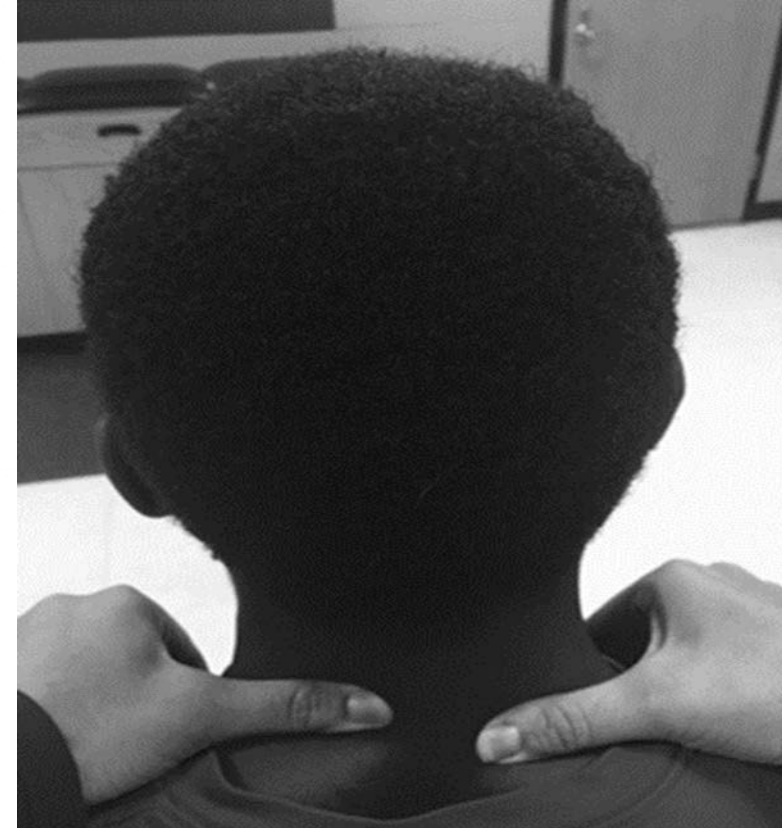




## **Mulligan Concept Mobilizations with Movement**

### **Transverse (Positional) SNAG**


- **Best used when the patient has complaints of pain and dysfunction between C5 – T1**
- **Best used when the patient has complaints of limited active range of motion (AROM) during any cervical motion “Multi-Purpose SNAG”**
- **Best used when the patient has complaints of centralized pain and dysfunction**
- **Best used when the patient presents with non-irritation of soft tissue structures**
  - They are not the choice in conditions that are highly irritable
- **SNAGs are most successful when symptoms are provoked by a movement and are not multilevel**

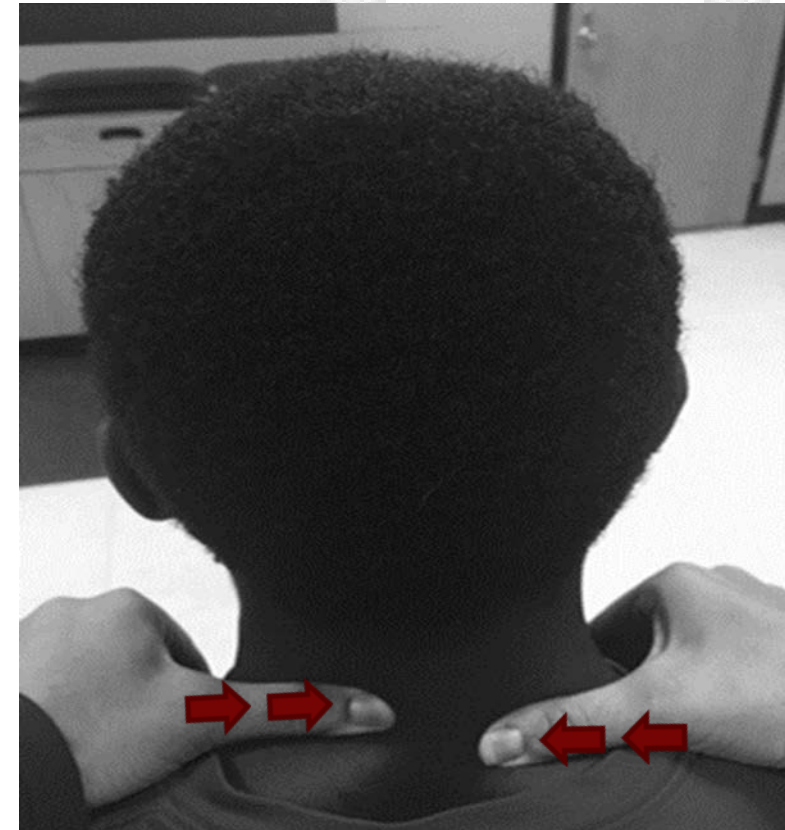


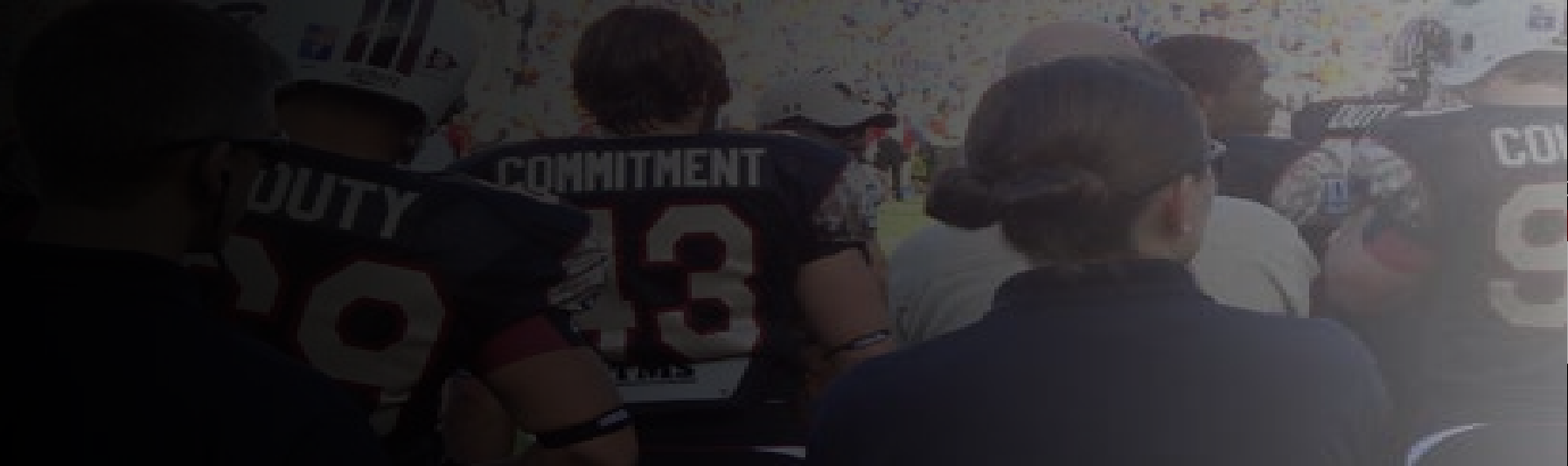


## Mulligan Concept Mobilizations with Movement

### Transverse (Positional) SNAG

- Patient will be seated with clinician standing behind
- Clinician will position their hands in a “U” shape → 
- Place the left thumb on the left side of the spinous process of the superior vertebrae
- Take up the slack of the soft tissue to come into contact with the vertebrae to be moved
- Place the right thumb on the right side of the spinous process of the lower vertebrae
- Apply a passive transverse glide to the facet (glide the facets towards each other)
- Ask the patient to perform the painful/restricted cervical motion
- Maintain the glide as the patient performs the entire motion
- If the motion is now pain free continue with 1 set of 10 repetitions
- Reassess the patient when the treatment is completed to determine if painful motion has been fully resolved





# QUESTIONS?

## ■ Android/iPhone

- <https://www.mulliganconceptapp.com>

## ■ Textbooks

- *The Mulligan Concept of Manual Therapy: Textbook of Techniques*, (1<sup>st</sup> Ed), Churchill Livingstone, Australia, 2015
- *Manual Therapy 'NAGS', 'SNAGS', 'MWMS' etc.* (6<sup>th</sup> Ed), Orthopedic Physical Therapy Products, 2010
- *Mobilisation with Movement: The Art and the Science*, (1<sup>st</sup> Ed), Churchill Livingstone, Australia, 2011

## ■ Websites

- <https://www.optp.com>
- <https://www.bmulligan.com>
- <http://www.na-mcta.com>
- <https://www.neseminars.com/the-mulligan-concept>

# References



- Bogduk, N. (2005). *Clinical and Radiological Anatomy of the Lumbar Spine and Sacrum*. 4th ed. Elsevier: Philadelphia.
- Borghouts, J. A., Koes, B. W., & Bouter, L. M. (1998). The clinical course and prognostic factors of non-specific neck pain: a systematic review. *Pain*, 77(1), 1-13.
- Bronfort, G., Evans, R., Nelson, B., Aker, P. D., Goldsmith, C. H., & Vernon, H. (2001). A randomized clinical trial of exercise and spinal manipulation for patients with chronic neck pain. *Spine*. 26(7); 788-797.
- 122.124.
- Childs, J. D., Whitman, J. M., Fritz, J. M., Piva, S. R., & Young, B. (2003). *Physical Therapy for the Cervical Spine and Temporomandibular Joint*. La Crosse, Wis: Orthopaedic Section of the American Physical Therapy Association Inc, 8-63.
- Childs, J. D., & Flynn, T. W. (2003). COMMENTS AND RESPONSES. *Ann Intern Med*. 138; 871-81.
- Childs, M. J. D., Fritz, J. M., Piva, S. R., & Whitman, J. M. (2004). Proposal of a classification system for patients with neck pain. *Journal of Orthopaedic & Sports Physical Therapy*. 34(11); 686-700.
- Childs, J., Cleland, J., Elliott, J., Deydre, T., Wainner, R., Whitman, J., et al. (2008). Neck Pain: Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability, and Health From the Orthopaedic Section of the American Physical Therapy Association. *J Orthop Sports Phys Ther*. 38(9); A1-A34.
- Chiradejant, A., Latimer, J., Maher, C.G., Stepkovich, N. (2002). Does the choice of spinal level treated during posteroanterior (PA) mobilization affect treatment outcome? *Physiotherapy Theory and Practice*. 18; 165-174.
- Cleland, Childs, McRae, Palmer & Stowell. (2005). Immediate effects of thoracic manipulation in patients with neck pain; a randomized clinical trial. *Manual Therapy*. 10, 127-35.
- Cleland, J. A., Glynn, P., Whitman, J. M., Eberhart, S. L., MacDonald, C., & Childs, J. D. (2007). Short-term effects of thrust versus nonthrust mobilization/manipulation directed at the thoracic spine in patients with neck pain: a randomized clinical trial. *Physical Therapy*. 87(4), 431-440.
- Cleland, J.A., Childs, J.D., Fritz, J.M., Whitman, J.M., & Eberhart, S.L. (2007). Development of a Clinical Prediction Rule for Guiding Treatment of a Subgroup of Patients With Neck Pain: Use of Thoracic Spine Manipulation, Exercise, and Patient Education. *Physical Therapy*. 87(1); 9-23.
- Cleland, J. A., Fritz, J. M., Whitman, J. M., & Palmer, J. A. (2006). The reliability and construct validity of the Neck Disability Index and patient specific functional scale in patients with cervical radiculopathy. *Spine*. 31(5); 598-602.
- Cleland, J. A., Mintken, P. E., Carpenter, K., Fritz, J. M., Glynn, P., Whitman, J., & Childs, J. D. (2010). Examination of a clinical prediction rule to identify patients with neck pain likely to benefit from thoracic spine thrust manipulation and a general cervical range of motion exercise: multi-center randomized clinical trial. *Physical Therapy*. 90(9); 1239-1250.
- Cook, C., Learman, K., Showalter, C., Kabbaz, V., & O'Halloran, B. (2013). Early use of thrust manipulation versus non-thrust manipulation: a randomized clinical trial. *Manual Therapy*, 18(3);191-198.
- Cross, K. M., Kuenze, C., Grindstaff, T., & Hertel, J. (2011). Thoracic spine thrust manipulation improves pain, range of motion, and self-reported function in patients with mechanical neck pain: a systematic review. *Journal of Orthopaedic & Sports Physical Therapy*. 41(9); 633-642.
- Durall, C. (2012). Therapeutic Exercise for Athletes with Nonspecific Neck Pain: A Current Concepts Review. *Sports Health: A Multidisciplinary Approach*. 4(4), 293-301.
- DeSantis, L., & Hasson, S. M. (2006). Use of mobilization with movement in the treatment of a patient with subacromial impingement: A case report. *Journal of Manual & Manipulative Therapy*, 14(2), 77-87.
- Devellis, R. F. (1996). A consumer's guide to finding, evaluating, and reporting on measurement instruments. *Arthritis & Rheumatism*. 9(3), 239-245.
- Dreisinger, T. E., & Nelson, B. (1996). Management of back pain in athletes. *Sports Medicine*. 21(4), 313-320.

# References

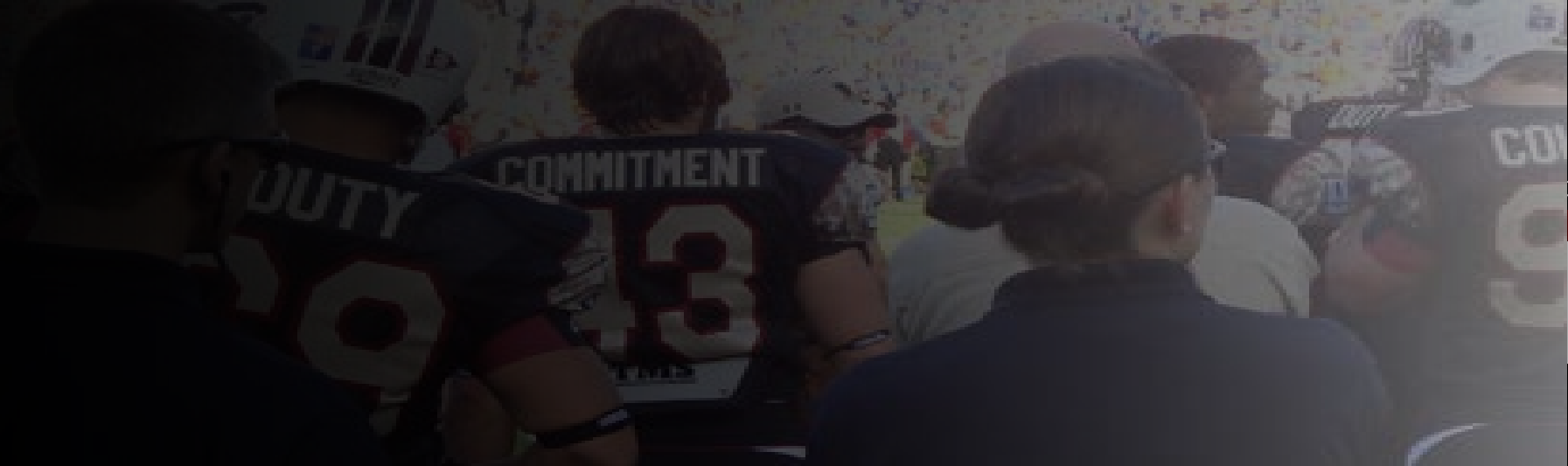


- Durall, C. (2012). Therapeutic Exercise for Athletes With Nonspecific Neck Pain: A Current Concepts Review. *Sports Health: A Multidisciplinary Approach*. 4(4), 293-301.
- Edmondston, S.J., Singer, K.P. (1997). Thoracic spine: anatomical and biomechanical considerations for manual therapy. *Manual Therapy*. 2(3), 132-143.
- El-Sodany, A. M., Alayat, M. S. M., & Zafer, A. M. I. (2014). Sustained Natural Apophyseal Glides Mobilization Versus Manipulation in the Treatment of Cervical Spine Disorders: A Randomized Control Trial. *International Journal of Advanced Research*. 2(6); 274-280.
- Exelby, L. (2002). The Mulligan concept: its application in the management of spinal conditions. *Manual Therapy*. 7(2); 64-70.
- Exelby, L. (1996). Peripheral mobilizations with movement. *Manual Therapy*. 1(3); 118-126.
- Fernandez-de-las-Penas, Fernandez-Carnero, Plaza Fernandez, Lomas-Vega & Miangolorra-Page. (2004). Dorsal manipulation in whiplash injury treatment: a randomized controlled trial. *Journal of Whiplash Related Disorders*. 3:55-71.
- Hing, W., Bigelow, R., & Bremner, T. (2008). Mulligan's mobilisation with movement: a review of the tenets and prescription of MWMs. *New Zealand Journal of Physiotherapy*. 36(3), 144-161.
- Horton, S. J. (2002). Acute locked thoracic spine: treatment with a modified SNAG. *Manual Therapy*. 7(2); 103-107.
- Hsieh, C. Y. J., Adams, A. H., Tobis, J., Hong, C. Z., Danielson, C., Platt, K., ... & Rubel, A. (2002). Effectiveness of four conservative treatments for subacute low back pain: a randomized clinical trial. *Spine*, 27(11), 1142-1148.
- Hurst, H., & Bolton, J. (2004). Assessing the clinical significance of change scores recorded on subjective outcome measures. *Journal of manipulative and physiological therapeutics*, 27(1), 26-35.
- Hubbard, T., Hertel, J., Sherbondy, P. (2006). Fibular Position in Individuals With Self-Reported Chronic Ankle Instability. *Journal of Orthopaedic and Sports Physical Therapy*. 36; 3-9.
- Koes, Bouter, L., van Mameren, H., Houbenfil, J. P., & Knipschild, P. (1993). A Randomized Clinical Trial of Manual Therapy and Physiotherapy for Persistent Back and Neck Complaints: Subgroup Analysis and Relationship Between Outcome.
- Koes, B. W., van Tulder, M. W., Ostelo, R., Burton, A. K., & Waddell, G. (2001). Clinical guidelines for the management of low back pain in primary care: an international comparison. *Spine*. 26(22), 2504-2513.
- Mulligan, B.R. (1993). Mobilisation with Movement. *Journal of Manual and Manipulative Therapy*. 1(4); 154-156
- Mulligan, B.R. (2004). *Manual Therapy: NAGS, SNAGS, MWM etc.* 6th Ed. Plane View Services Ltd. Wellington, NZ
- Mulligan, B.R. (2010). *Manual Therapy: NAGS, SNAGS, MWM etc.* 6th Ed. Plane View Services Ltd. Wellington, NZ
- Paungmali, A., O'Leary, S., Souvlis, T., & Vicenzino, B. (2003). Hypoalgesic and sympathoexcitatory effects of mobilization with movement for lateral epicondylalgia. *Physical Therapy*. 83(4), 374-383.
- Sampsell, E. (2010). Rehabilitation of the spine following sports injury. *Clinics in Sports Medicine*. 29(1); 127-156.

# References



- Stump, J. L., & Redwood, D. (2002). The use and role of sport chiropractors in the National Football League: A short report. *Journal of manipulative and physiological therapeutics*. 25(3); A2-A5.
- Teys, P., Bisset, L., Vicenzino, B. (2008). The Initial Effects of a Mulligan's Mobilization with Movement technique on Range of Movement and Pressure Pain Threshold in Pain-Limited Shoulders. *Manual Therapy*. 13; 37-42.
- Vicenzino, B., Paungmali, A., Teys, P. (2007) Mulligan's Mobilization-with-Movement, Positional Faults and Pain relief: Current Concepts from a Critical Review of Literature. *Manual Therapy*. 12; 98-108.



**THANK YOU!**