Nordic System Kaltenborn-Evjenth OMT Standard 2015-2017

Nordic System Kaltenborn-Evjenth OMT Concept includes principles and techniques with roots from the:

- Swedish Gymnastik Director (from Ling), and its later evolution in Physical therapy, Physical Education and Athletic Training, later called Medical Training Therapy.

- Orthopedic Medicine (from J. H. Cyriax and J. B. Mennell),

- Osteopathy (from A. Stoddard),

- Chiropractic (from A. Cramer),

- Kaltenborn's and Evjenth's original contributions as well as from other therapists worldwide.

The foundational reference books for the MMT standard are the most updated versions from:

- Kaltenborn F. Manual Mobilization of the Joints, Volume I: The Extremities.
- Kaltenborn F. Manual Mobilization of the Joints, Volume II: The Spine.

The contents of the Nordic System K-E OMT standard are based on the Overview of the OMT Nordic System, Kaltenborn-Evjenth Concept (pp. 2-3, The Extremities, 8th edition (2014).

The goal of the present OMMT standard is focused on updating, homogenizing and developing the Kaltenborn-Evjenth OMT principles of diagnosis and treatment for arthro-neuro-muscular conditions. A lot of technique variations sharing common principles are published and can be considered as "subtle differences in grip and patient positioning compared *with reference books*. These should be considered additional options for delivery of the technique, keeping in mind that grip and body positioning change depending on the momentary needs of both patient and practitioner" (p. vii, The Extremities).

Overview

The *Kaltenborn-Evjenth Concept* principles and techniques for joint testing and mobilization presented in this book are part of the Orthopedic Manual Therapy Nordic System scope of practice.

I. Physical Diagnosis (biomechanical and functional assessment)

- **A. Screening exam:** An abbreviated exam to quickly identify the region where a problem is located and focus the detailed examination
- **B. Detailed exam:**
  1. ***History:*** Narrow diagnostic possibilities; develop early hypotheses to be confirmed by further exam; determine whether or not symptoms are musculoskeletal and treatable with OMT. *(Includes present episode, past medical history, related personal history, family history, review of systems)*
  2. ***Inspection:*** Further focus the exam. *(Includes posture, shape, skin, assistive devices)*
  3. ***Tests of function***
     - **a. Active and passive movements:** Identify location, type, and severity of dysfunction. *(Includes standard-anatomical-uniaxial movements and combined-functional-multiaxial movements)*
     - **b. Translatoric joint play movements:** Further differentiate articular from nonarticular lesions; identify directions of joint restrictions. *(Includes traction, compression, gliding)*
     - **c. Resisted movements:** Test neuromuscular integrity and status of associated joints, nerves and vascular supply.
     - **d. Passive soft tissue movements:** Differentiate joint from soft tissue dysfunction and the type of soft tissue involvement. *(Includes physiological movements, accessory movements)*
     - **e. Additional tests** *(Includes coordination, speed, endurance, functional capacity assessment ...)*
  4. ***Palpation (Includes tissue characteristics, structures)***
  5. ***Neurologic and vascular examination***
- **C. Medical diagnostic studies** *(Includes diagnostic imaging, lab tests, electro-diagnostic tests, punctures)*
- **D. Diagnosis and trial treatment**

Overview Kaltenborn-Evjenth Concept. Physical Diagnosis

Section 1: Anatomical joint

Note: This document does not pretend to be an exhaustive description of the anatomical joint evaluation and treatment, fully described in the literature below, but a document to integrate common principles within K-E OMT Anatomical joint Section of the Standards committee was joined at the conference in Zaragoza 2015. The anatomical joint section of the standards committee is represented by Markku Paatelma, Mika Ulaska, Pekka Anttila (Finland), Andreas Gattermeier (Austria), John Krauss and Christie Booth (USA) and César Hidalgo (Spain)

II. Treatment

A. To relieve symptoms (most often pain)

1. ***Immobilization***
   - *General: bed rest*
   - *Specific: corsets, splinting, casting, taping*
2. ***Thermo-Hydro-Electro (T-H-E) therapy***
3. ***Pain relief joint mobilization*** *(Grade I-II Slack Zone in the Actual Resting Position)*
   - *Intermittent manual traction*
   - *Vibrations, oscillations*
4. ***Special procedures*** *(Includes acupuncture, acupressure, soft tissue mobilization ...)*

B. To increase mobility

1. ***Soft tissue mobilization***
   a. **Passive soft tissue mobilization**
      - *Classical, functional, and friction massage*
   b. **Active-facilitated soft tissue mobilization**
      - *Contract-relax, reciprocal inhibition, muscle stretching*
2. ***Joint mobilization***
   a. **Relaxation joint mobilization** (Grade I - II)
      - *Three-dimensional mobilizations*
   b. **Stretch joint mobilization** (Grade III)
      - *Manual mobilization in the joint Actual Resting Position*
      - *Manual mobilization at the point of restriction*
   c. **Manipulation**
      - *High velocity, short amplitude, linear thrust movement*
3. ***Neural tissue mobilization***
   To increase mobility of dura mater, nerve roots, and peripheral nerves
4. ***Specialized exercise***
   To increase or maintain soft tissue length and mobility and joint mobility

C. To limit movement

1. ***Supportive devices***
2. ***Specialized exercise***

Overview Kaltenborn-Evjenth Concept. Treatment

D. To inform, instruct, and train
Exercises and education to improve function, compensate for injuries, and prevent reinjury. Instruction in relevant ergonomics and self-care techniques, e.g., medical training therapy, automobilization, autostabilization, autostretching, back school, activities of daily living, etc.

Kaltenborn-Evjenth Concept.

The following will join the core books of the anatomical section of KE-OMT

- Most updated version of Professor Kaltenborn´s “Manual Mobilization of the Joints: Volume I and II”.
- 2nd edition “Translatoric Spinal Manipulation” (TSM) book from John Krauss, Olaf Evjenth and Doug Creighton.
- .

The main adaptations within TSM 2nd edition are:

1. Terminology:

- All previous techniques called “distraction”, “separation”,… are named and integrated now as “traction techniques”. The principle is that we intend to apply traction and probably separation or distraction occurs. For example, page 53 of TSM will be now called “C2-C7 facet traction” or page 92 will be now called “Ribs 2-12 – Traction”
- The term “sidebending” thrust techniques will be changed for a name that promotes that the thrust is delivered in a translatoric way. ~~We are working to find a name and options are “medial”, “medial glide” or “gliding under traction”~~.
- The term “manipulation” applied in US for all kind of manual procedure will be changed to “thrust” and “nonthrust” to differentiate between “manipulation” and “mobilization” as in last editions of Professor Kaltenborn´s volume I and II. Appropiate adaptations are made throughout the book according to this change.
- Integration of the term “treatment plane”, “Grade I-II Slack Zone”, “Grade I-II Transition Zone” throughout the text when appropriate.
- Adaptation of the terminology “First stop” to describe the precise point of thrust application.
- Throughout this document, joint “mobilization” have the same meaning as “nonthrust”mobilization and joint “manipulation” is similar to “thrust” mobilization.

2. Integration of core books as a progressive sequence of student learning based on clinical skills development and safety for the patient. New labeling for technique description (introductory, intermediate, advanced) and integration of a sequence of Professor´s Kaltenborn Volume I and II and TSM techniques (especially techniques in the actual resting position and outside the resting position) according to these criteria have been created (see examples below)

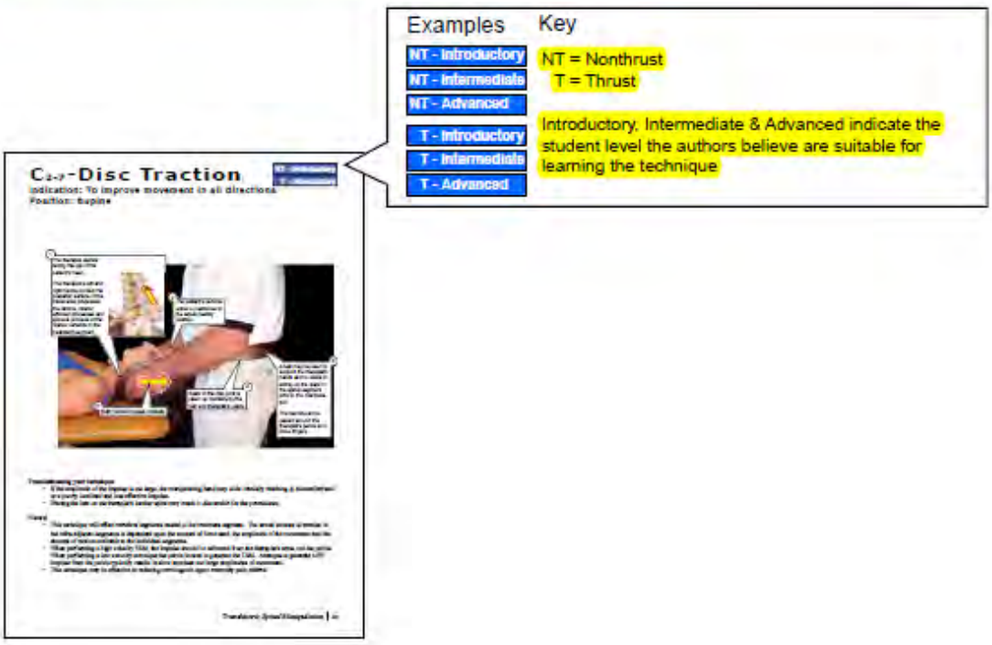
3. New description of technical pages, integrating these corrections.

Forward

The following text is intended to be used by physical therapists and physical therapist students interested in developing their theoretical understanding and physical skill level in the application of translatoric spinal manipulations and mobilizations (TSM). Because this text is intended for an international audience with diverse educational and practice settings, the authors have adopted the term thrust to indicate a manipulation and nonthurst to indicate a mobilization. The authors feel that both mobilizations and manipulations are "skilled passive movements to the joint and/or related soft tissue that are applied at varying amplitudes" where thrust techniques are performed at high velocity and nonthrust techniques are performed at low velocity.

Within this text, the authors have categorized techniques as introductory, intermediate and advanced. Introductory techniques are suitable for teaching individuals starting to develop their manual therapy focused examination and intervention skills. Kaltenborn's Manual Mobilization of the Joints Vol. I & II provide prerequisite introductory knowledge and skills adjacent to the information taught in the TSM text. Techniques included in this category were selected based on how complex they are to apply, with an emphasis of minimizing any risk associated with improper application of the techniques. Techniques are performed exclusively in the actual/momentary resting position (as defined by Kaltenborn). Clinical supervision is recommended but not required for the learner to begin applying introductory techniques in the clinical setting. In the US Educational system, the techniques are suitable for teaching at the entry level DPT program level which may then be reinforced during the final full time clinical internships. Intermediate techniques are suitable for teaching individuals who have mastered all introductory skills. Techniques are inherently more complex to apply and carry a greater risk (still a low level of risk as compared to rotatory manipulation) of causing a minimal adverse response if applied incorrectly. Some techniques may be applied out of the actual/momentary resting position. Care is taken to avoid joint compression during any joint gliding mobilizations or manipulations. Clinical supervision is necessary for the learner to fully master the application of intermediate techniques in the clinical setting. In the US Educational system, the techniques are suitable for teaching at the Post Professional program level and reinforced during clinical residencies. Advanced techniques are suitable for teaching individuals who have mastered all introductory and intermediate skills. Techniques are complex to apply and carry a greater risk (still considered low as compared to rotatory manipulation) of causing a minimal adverse response if applied incorrectly. Many techniques are applied closer to the position of motion restriction. Care is taken to avoid joint compression during any joint gliding mobilizations or manipulations. Clinical supervision is necessary for the learner to fully master the application of advanced techniques in the clinical setting. In the US Educational system, the techniques are suitable for teaching at the Post Professional program level and reinforced during clinical fellowships.

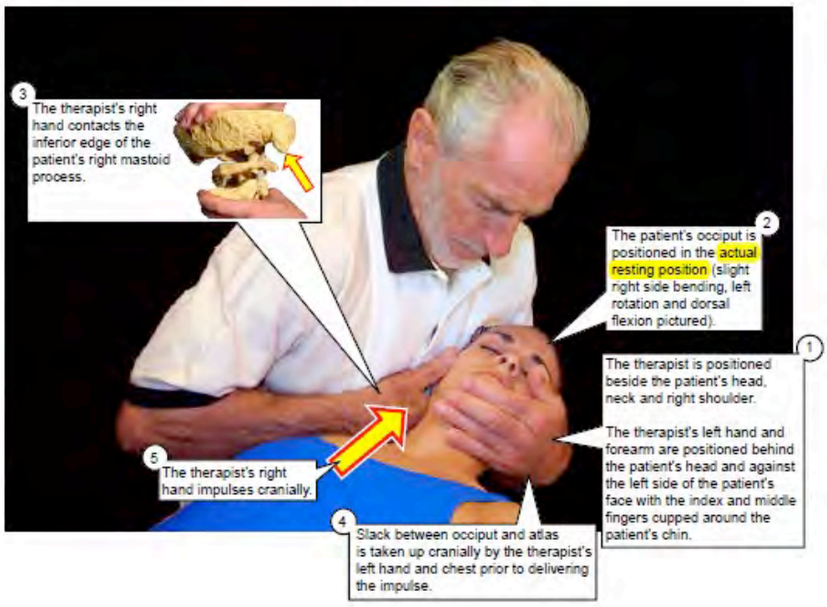
To identify whether or not the authors feel a given technique is appropriate for an introductory, intermediate, or advanced learner and at which point nonthrust or thrust is recommended, each technique page includes two boxes in the upper right corner, next to the technique title (see the illustration below for further detail).



OA-Traction

NT - Introductory
T - Introductory

Indication: To improve movement in all directions (Right OA Joint)
Position: Supine



Some key principles have been discussed during the sessions of this section and the main conclusions of the key principles will be detailed.

Principles:

1. Specificity during joint treatment:
   - ✓ In the Extremities: although joint manipulation is intended for intra-articular restrictions and joint mobilization is intended for extra-articular restrictions, manipulation is not specific for intra-articular and mobilization is not specific for extra-articular structures, there is no pure specific treatment for intra-articular or extra-articular structures of the anatomical joint. "All joint movement involves the entire joint complex and all joint mobilization techniques affect the entire joint complex…" (p. 12, The Extremities).
   - ✓ In the Spine, no specific treatment of a single anatomical joint in the spine, but the specific movement of the spine is affecting the whole mobile segment. A technique can have a goal to

focus the effect on an unilateral “facet traction” but it is impossible to avoid an effect in the intervertebral disc joint during the same procedure.

For example:

- a traction in the intervertebral disk joint produce traction or gliding in the facet joints depending on the facet orientation.
- a technique whose goal is to produce a unilateral cervical facet traction using a noncoupled position will provoke a compression on the contralateral facet joint and probably a compression and shearing movement in the intervertebral disc joint.

2. Safety and effectiveness: translatoric vs rotatoric thrusts

   There are no totally “safe” mobilization and manipulation techniques but depends on clinical reasoning for its indication and on the proper technical application. Kaltenborn-Evjenth Concept has developed translatoric linear thrust techniques rather than rotatoric thrusts to provide with an effective and safer treatment for anatomical joint hypomobility.

3. Translatoric manipulation is applied for intra-articular hypomobility while translatoric mobilization is applied for extra- and periarticular hypomobility.

4. Manipulation is applied in the actual/momentary resting position while mobilization can start in any position (usually from the resting position but including end-range positions).

   This principle will be illustrated comparing two techniques with the same goal (OA traction) appearing in two basic references of this standard (Fig. 18b, p. 55 in Kaltenborn´s Volume III book and p. 32, in TSM). In essence, the technique shown by Freddy and Olaf is quite similar and sharing principles. Although the description of TSM details the OA position (slight right sidebending, left rotation and dorsal flexion) and Kaltenborn´s volume III book describes that the therapist must look for the actual resting position.
   Observe this small adaptation from TSM (see page 7 of this document , with permission and agreement of John Krauss) describing an OA segmental position of slight right sidebending, left rotation and dorsal flexion prior to delivering the impulse as an illustrating description of the final position after looking for the position for better contact with the mastoid process, with more joint play and with more patient´s relaxation (actual resting position).

5. Recommended sequence for intra-articular hypomobility (manipulation):

   From a risk/benefit analysis, the principle is to choose the effective and safest technique. From a structural (anatomical joint, disc and neurovascular) safety point of view, traction is the safest treatment for anatomical joint and mobile segment hypomobility.

The recommended sequence for intra-articular hypomobility treatment is:

- Traction-thrust as a trial treatment to confirm the diagnostic hypothesis with modification of patient´s position, therapist´s grip, stabilization or intensity according to the reassessment of key signs and symptoms. In the spine, traction affecting the whole mobile segment can target the intervertebral disc joint or facet joints. First choice technique is intervertebral disk traction.

  Note about terminology: Two terms appear in the KE related books considering separation of the joint surfaces. “Traction is a linear translatoric joint play movement that separates (pulls apart) joint surfaces at a right angle to the treatment plane”. “Distraction is a separation of the surfaces of a joint not in pure right angle to the treatment plane”. Distraction is the result of the traction applied in the joint as defined “Traction-manipulation is a translatoric high velocity, low amplitude thrust movement producing separation (distraction) in the joint…” (Kaltenborn´s vol III, p. 2).

- Gliding-thrust techniques can be applied as first choice techniques in cases of suspicion of positional fault in a joint (that could react negatively to traction-thrust), in joints in which traction is difficult to develop like patellofemoral or sacroiliac joint or when it is difficult to avoid symptoms from adjacent hypermobile segments due to a lack of stabilization. However, gliding-thrust is usually applied after having applied traction-thrust with no negative reaction but not successful enough in the reassessment because it can provoke compression in the anatomical joint or mobile segment and it is recommended to be associated with traction simultaneously.

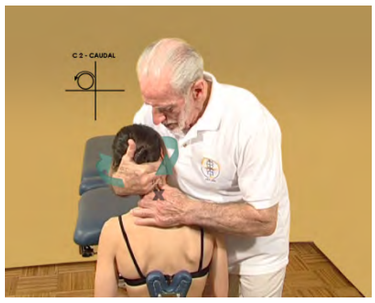
  “Gliding-thrusts are best taught only to those who have adquired the prerequisite quickness and coordination learned through the practice of safe traction manipulations” (p. 85, The Extremities) and have trained the sensibility to evaluate and treat with gliding techniques following the momentary treatment plane

  This concept is especially important while describing gliding mobilization or manipulation techniques in texts in relation to standard Kaltenborn´s treatment plane to avoid inappropriate therapy (e.g., during a ventral-cranial glide of C2 segment, the direction of the standard treatment plane is 45º angle with the body of the vertebra, oriented in a dorsal/caudal to ventral/cranial direction. While a command as “treatment plane direction should be directed to the opposite eye” is a helpful approximation for the learning process, it can be a source of undesired effects and unsuccessful treatments if the practitioner is directly applying the force in this standard direction. Anatomical normal (e.g., joint facet tropism) and pathological (due to degenerative process) variations or patient´s posture (e.g., a forward head posture could provoke a more horizontal treatment plane) can make the plane of treatment change from standard descriptions. Therefore, the practitioner should look for the momentary treatment plane. Starting from the standard treatment plane direction, the practitioner should find the therapeutic direction which produces optimal quantity and quality of movement.

6. Use of noncoupled movements during anatomical joint treatment

   One of the key principles for treating a hypermobile joint is to increase movement in adjacent joints or segments while protecting hypermobile joints or segments to be stressed during the procedure. Noncoupled positions can effectively limit the movement of joints or segments but through tightening of the structures and this can be provocative and aggravate hypermobility, not being indicated in these cases.
   For example, during C2-C3 ventral cranial glide mobilization targeting the left facet joint from a position of ventral flexion, right sidebending and right rotation, the therapist can stabilize the movement of the caudal segments (C3 and caudal) via:

- Manual stabilization (Fig. 2):



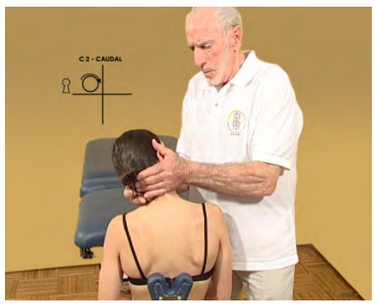


Fig. 2 Manual stabilization of C3

- Noncoupled position (Fig. 3): use of positioning in ventral flexion,
  left sidebending and right rotation of C3 and caudal segments during the procedure may help stabilize the lower segments through noncoupled stress (compression and distraction in the facet joints, compression and shearing movement in the intervertebral disc joint). This noncoupled position of C3 and caudal segments should be tested prior to the mobilization (Fig. 4). The presence of symptoms (e.g. pain), lack of patient´s relaxation or a hypermobile segment contraindicates this noncoupled procedure and manual stabilization is recommended.

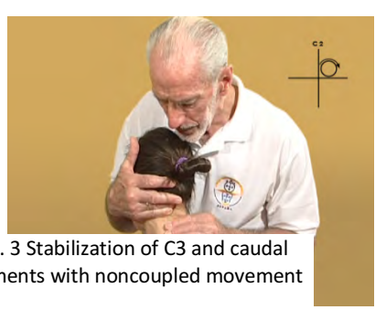


Fig. 3 Stabilization of C3 and caudal segments with noncoupled movement

Fig. 4 Test of noncoupled tolerance for C3 and caudal segments

Use of translatoric treatment in noncoupled positions

Positioning of the segment to be treated in noncoupled positions allows to choose the axis of movement for focusing therapeutic effects on the most hypomobile part of the segment being a very powerful way to elongate shortened tissues.

For example, a noncoupled position of ventral flexion, left sidebending and right rotation of a lumbar segment and translatoric impulse could be associated to provoke a traction in the right facet joint, via a bending movement but also a compression and the axis of movement on the left side of the segment and a shearing movement in the disc intervertebral joint). Therefore, this powerful mobilization treatment "…must be performed with care in the spine, as these movements can suddenly hit a hard stop (for example due to facet joint opposition) and any attempt to produce movement beyond that point could result in injury" (p. 16 The Spine).

Also, the clinician must have the ability to manually detect individual and variable patterns of coupled and noncoupled movement in each patient

Use of translatoric treatment in noncoupled positions as thrust:

From a risk/benefit point of view, a skilled and experienced therapist should treat the intra-articular dysfunction of the patient with as safer and effective techniques as possible. The translatoric thrust techniques in the actual resting position allow a safe and effective trial and progressive treatment and should always be applied first. If necessary and complementarily, procedures outside the resting position including noncoupled positions should always be applied first as stretching mobilizations. In some practical scenarios, clinical background can make a practitioner to decide on practicing a thrust outside the resting position after having tried safer and potentially less risky procedures. Therefore, these thrust procedures outside the resting position require a high level of skill and knowledge to apply safely and should only be applied by well-trained and certified OMT practitioners.

This standard of practice allows for a safe and effective approach in which a patient receives as less force as possible during the treatment, maximize the effectiveness and safety in the procedures, observing progressive reaction from the patient to the evolution of mobilization and manipulation treatment applied by the therapist, minimizing adverse responses.

Integration of Functional gliding techniques

Taking into account biomechanical principles, physiological patterns of movement, which have changed in the course of somatic disorders, are paved by this treatment technique and reintegrated into everyday movements.

If one assumes that a somatic dysfunction causes a change in the roll-gliding mechanism and thus also affects the efferent information to the movement-controlling musculature, effective therapy has to treat the mechanical inhibition on the one hand and restore the disturbed control function of the muscle on the other hand.

Inflammatory processes lead to a change in the synovial fluid with a decrease in lipids and hyaluronic acid and thus to a reduction in lubricity. The resulting increase in the friction resistance causes a change in the gliding behavior and a change in the proprioceptive afferents which in turn causes a change in the movement pattern. A typical example is evasive mechanisms in abduction of the arm. The disturbance of the caudal gliding of the humerus, and by nociceptive afferents from the subacromial compression, trigger unphysiological movements of the shoulder girdle. Although the patient shows significantly more movement in the glenohumeral joint when examining the passive mobility, he is not able to incorporate these into his active movement pattern

Functional gliding stimulates physiological proprioceptive information from the peripheral structures and transmits them to the CNS and its subsystems and cross-links them.

The technique is carried out in three intensities: passive, active assistive and active. The selection is made according to various criteria: nociception, degree of mechanical resistance during sliding, muscular compliance of the patient and resilience of the peri-articular structures.

Technical implementation:

After determining the painless, passive range of movement of the current joint and the definition of the restricted gliding direction (Kaltenborn convex / concave rule), the joint is passively moved to the point of the path of movement where the first resistance of the gliding play is felt. Here, an exactly dosed pulse is given to the physiological direction of the gliding movement, and at the same time the passive movement is continued until the gliding impulse does not increase the movement (without pain and avoidance). By frequent repetition, a facilitation of the movement is achieved.

When indicated, the patient's active movement is actively supported by the patient. In the last phase of the rehabilitation the movement is actively carried out independently by the patient, whereby the therapist only supports the gliding movement.

By providing guidance on appropriate self-exercises, the patient can speed up the progress of the healing process.

Indications:

• Functional disorders of the arthromuscular system without a capsuloligamentary restriction

• stereotyped movements

• Pathological movement patterns

In connection with a comprehensive mobilization of the neuromuscular skeletal system in the Kaltenborn / Evjenth concept, this treatment technology is an essential component.

..nothing but function can restore function, nothing but movement can restore movement."(Menell, J. 1949 The science and art of joint manipulation Vol 1).

Section 2: Myofascial evaluation and treatment

K-E OMT Myofascial Section of the Standards committee was joined at the conference in Zaragoza 2015. The myofascial section of the standards committee was joined by Pablo Fanlo (Spain), Jochen Aeckerle (Australia), Miroslaw Kokosz (Poland), Melodie Kondratek (USA) and José Miguel Tricás (Spain).

The following will join the core books of the myofascial section of KE-OMT

EXTREMITIES

- Manual Mobilization of the Joints. Vol. I the Extremities. F. Kaltenborn.
  Myofascial Mobilization and Self-Mobilization in OMT. Vol I. The Extremities. JM. Tricás, C. Hidalgo, O. Lucha and O. Evjenth. This book is a compilation and update of the previous books of "Muscle Stretching in Manual Therapy. A Clinical Manual. Vol I. The Extremities. O. Evjenth and J. Hamberg."and "Auto Stretching. The Complete Manual of Specific Stretching. O.Evjenth and J. Hamberg.

- Muscle Stretching in Manual Therapy. A Clinical Manual. Vol I. The Extremities. O. Evjenth and J. Hamberg.
- Auto Stretching. The Complete Manual of Specific Stretching. O.Evjenth and J. Hamberg.

SPINE

- Manual Mobilization of the Joints. Vol. II the Spine. F. Kaltenborn.
- Muscle Stretching in Manual Therapy. A Clinical Manual. Vol II. The Spinal Column and the TM-Joint. O. Evjenth and J. Hamberg.
- Auto Stretching. The Complete Manual of Specific Stretching. O. Evjenth and J. Hamberg.

General Principles

Core books:

Chapter 1, 2 and 3. Myofascial Mobilization and Self-Mobilization in OMT. Vol I. The Extremities. JM. Tricás, C. Hidalgo, O. Lucha and O. Evjenth.

Pag. 7-12 of Muscle Stretching in Manual Therapy. A Clinical Manual. Vol I. The Extremities. O. Evjenth and J. Hamberg. BASIC

Pag. 5-9 of Auto Stretching. The Complete Manual of Specific Stretching. O. Evjenth and J. Hamberg. BASIC

1. Recommended procedure for muscle stretching

Pag 41-53 of Myofascial Mobilization and Self-Mobilization in OMT. Vol I. The Extremities. JM. Tricás, C. Hidalgo, O. Lucha and O. Evjenth.

Pag. 10-11 of Muscle Stretching in Manual Therapy. A Clinical Manual. Vol I. The Extremities. O. Evjenth and J. Hamberg.

2. OMT Evaluation

2.1 Basic scheme of K-E OMT Evaluation process

Overview

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A. Screening exam: An abbreviated exam to quickly identify the region where a problem is located and focus the detailed examination

B. Detailed exam:

1. ***History:*** Narrow diagnostic possibilities; develop early hypotheses to be confirmed by further exam; determine whether or not symptoms are musculoskeletal and treatable with OMT. *(Includes present episode, past medical history, related personal history, family history, review of systems)*
2. ***Inspection:*** Further focus the exam. *(Includes posture, shape, skin, assistive devices)*
3. ***Tests of function***
   a. **Active and passive movements:** Identify location, type, and severity of dysfunction. *(Includes standard-anatomical-uniaxial movements and combined-functional-multiaxial movements)*
   b. **Translatoric joint play movements:** Further differentiate articular from nonarticular lesions; identify directions of joint restrictions. *(Includes traction, compression, gliding)*
   c. **Resisted movements:** Test neuromuscular integrity and status of associated joints, nerves and vascular supply.
   d. **Passive soft tissue movements:** Differentiate joint from soft tissue dysfunction and the type of soft tissue involvement. *(Includes physiological movements, accessory movements)*
   e. **Additional tests** *(Includes coordination, speed, endurance, functional capacity assessment ...)*
4. ***Palpation (Includes tissue characteristics, structures)***
5. ***Neurologic and vascular examination***

C. Medical diagnostic studies *(Includes diagnostic imaging, lab tests, electro-diagnostic tests, punctures)*

D. Diagnosis and trial treatment

Chapter 3. Tests of Function in Manual Mobilization of the Joints. Vol. I the Extremities. F. Kaltenborn develops the principles of K-E OMT evaluation.

Resisted tests and Differential diagnosis of pain in a muscle synergy (Pag. 49-50) and Passive soft tissue movements (Physiological and accessory movements) (Pag. 51-52) are explained in Manual Mobilization of the Joints. Vol. I the Extremities. F. Kaltenborn or Pag. 52-55 of Manual Mobilization of the Joints. Vol. II the Spine. F. Kaltenborn

2.2. Principles of Evaluation:

CHAPTER 1. Myofascial Mobilization and Self-Mobilization in OMT. Vol I. The Extremities. JM. Tricás, C. Hidalgo, O. Lucha and O. Evjenth. (Pages 12-35)

EVALUATION. Hypomobility / Symptoms evaluation of the physiological joint

Clinical reasoning for an indication of myofascial mobilization

- Is OMT indicated or contraindicated?
- Should OMT focus on symptom alleviation or function examination?
- Is there Hypermobility, normal or hypomobility?
- Which structure of the physiological joint correlates to hypomobility?
- Which type and where is muscle hypomobility located?
- Which type of muscle mobilization should be applied and how is it reassessed?

Anatomical joint hypomobility / symptoms localization

Physiological and pathological arthrokinematics

Muscle stretching and hypomobility / symptoms in the anatomical joint

Neural hypomobility / symptoms localization

Neural localization by a remote movement

Neural localization by palpation: bowstring test as neural provocation test and neural alleviation test

Muscle stretching and neural origin of hypomobility / symptoms

Skin and superficial tissue hypomobility / symptoms localization

Muscle stretching and hypomobility / symptoms in the skin

Myofascial tissue hypomobility / symptoms localization

Muscle localization test in contraction:

- Assessment of a secondary function of one muscle in an adjacent joint
- Assessment of a muscle function which is secondary in the same joint
- Reciprocal inhibition procedures

Muscle localization test in stretching

- Localization of polyarticular muscles
- Localization of monoarticular muscles

Muscle localization test in palpation

- Myofascial bowstring test in stretching: provocation and alleviation test
- Myofascial bowstring test in contraction: provocation and alleviation test

Myofascial function evaluation

Passive Physiological mobility test

- Movement quantity
- Movement quality (end-feel)
- Behavior of symptoms
- Passive physiological movement trial treatment: reflex hypomobility and structural hypomobility

Active physiological mobility testing

Accesory mobility testing

Accesory Grades of Movement

OMT diagnosis of muscle hypomobility

Contraindications for general muscle stretching to increase mobility

3. **Principles of OMT Myofascial Mobilization Treatment**

CHAPTER 2. Myofascial Mobilization and Self-Mobilization in OMT. Vol I. The Extremities. JM. Tricás, C. Hidalgo, O. Lucha and O. Evjenth. (Pages 37-67)

Muscle stretching classification

Dynamic mobilization (AROM)

Ballistic stretching

Static stretching

Stretching assisted by Postisometrical relaxation

Indication of stretching according to the OMT therapeutic aims

Symptom treatment

Function treatment

Passive physiological hypomobility treatment.

- Muscle reflex hypomobility treatment: Relaxation and movement increase by PNF stretch
- Muscle structural hypomobility treatment:
  Duration of the stretch

Frequency of the stretching

Duration of the stretching program

Intensity (force) of the stretching

- Reflex and structural muscle hypomobility treatment:

Active physiological hypomobility treatment

Recommended therapeutic procedure for muscle self-stretching

Accesory hypomobility treatment

- Muscle play hypomobility
  Muscle play treatment techniques without joint movement

  Muscle play treatment techniques with joint movement. Functional massage

    Shortening functional massage

    Lengthening functional massage

    Gliding functional massage

- Intermuscular play hypomobility
  Intermuscular play treatment techniques without joint movement

  Intermuscular play treatment techniques with joint movement

Muscle stretching within joint hypermobility management

Muscle stretching and somatic dysfunction

Self treatment in myofascial treatment

Information, instruction, training of the patient

Self-stretching and long-term maintenance of ROM improvement.

Self-stretching teaching methodology

Recommended therapeutic procedure for muscle self-stretching

Instructions for patient's self-stretching management

Muscle stretching and sports.

Effects of the stretching on physical performance.

Effects of stretching for injury prevention.

CHAPTER 3. Myofascial Mobilization and Self-Mobilization in OMT. Vol I. The Extremities. JM. Tricás, C. Hidalgo, O. Lucha and O. Evjenth. (Pages 69-79)

Special considerations about myofascial mobilization and stretching

Stretching preparation

Physiological, therapeutic and pathological movement axis

Adaptation of muscle stretching in the case of pathological arthrokinematics

- Accessory movement techniques without joint movement
- Accessory movement techniques with joint movement (functional and compartmental massage)
- Translatoric techniques (joint traction or gliding) associated to muscle stretching
- Joint sequencing during polyarticular muscles stretching

Muscle stretching adaptation to avoid neural distress

- During diagnosis
- During treatment

Exploration of the maximal tissue resistance to stretching

Use of breathing during the stretching

Continuous reassessment of the indication / contraindication during stretching

Treatment of active physiological hypomobility and stimulation of antagonist muscles

Active and passive function integration

Stimulation specificity

Progression of stimulation of the antagonist muscles

Reference for Stretching techniques for Extremities

- Myofascial Mobilization and Self-Mobilization in OMT. Vol I. The Extremities. JM. Tricás, C. Hidalgo, O. Lucha and O. Evjenth

Muscle Stretching in Manual Therapy. A Clinical Manual. Vol I. The Extremities. O. Evjenth and J. Hamberg.

Auto Stretching. The Complete Manual of Specific Stretching. O.Evjenth and J. Hamberg.

Reference for Stretching techniques for Spine

- Muscle Stretching in Manual Therapy. A Clinical Manual. Vol II. The Spinal Column and the TM-Joint. O. Evjenth and J. Hamberg.
- Auto Stretching. The Complete Manual of Specific Stretching. O. Evjenth and J. Hamberg.

Section 3: Nervous system

BACKGROUND

K-E OMT Neural Section of the Standards committee was joined at the conference in Zaragoza 2015. The neural section of the standards committee is represented by Ragnar Faleij from Sweden, Dr Elena Bueno Gracia from Spain and Siniša Poznić from Croatia.

K-E OMT NEURAL SECTION SURVEY 2016

In 2016 a survey was sent out to all teachers in K-E OMT. From the answers from the survey the neural section got some valuable information from 20 teachers in 13 countries, in summary:

- 19/20 teach symptom localization by alleviation/provocation to differentiate between musculoskeletal and neural involvement.
- 19/20 teach clinical examination for neuropathic pain involvement.
- Only 2/13 countries use screening questionnaires to test for for neuropathic pain.
- The questionnaires for neuropathic pain used were DN4, LANSS and painDETECT.
- 18/20 teach clinical examination to test for central nervous system involvement.
- No Screening questionnaires was used to test for central nervous system involvement.
- 9/20 teach clinical examination to test for cranial nerve involvement.
- No Screening questionnaires was used to test for cranial nerve involvement.

- 19/20 teach screening and clinical examination for peripheral nervous system involvement.

- No Screening questionnaires was used to test for peripheral nervous system involvement.

- When teaching examination and treatment of nerve mobility 13/20 base their techniques on Kaltenborn-Evjenth from “The Spine”, and/or Butler and/or Shacklock. 5/20 base their techniques on Elvey.

- 20/20 teach screening tests for nerve mobility.

- 20/20 teach mobility tests for nn. Median, Radial, Ulnar, Sciatic, Femoral, 17/20 Tibial, Peroneal and 12/20 Sural.

- 12/20 use the term “standard Sequence”.

- Between 7-10/20 considered different responses normal/negative during nerve mobility testing.
- 15/20 use the terms “normal/abnormal” and 10/20 use positive/negative when they teach how interpret the findings of a nerve mobility test.

- 10/20 teach nerve palpation for sural nerve and 19/20 teach nerve palpation for sciatic nerve. It seems like nerve palpation is not taught for all peripheral nerves.

- 18/20 teach techniques directed to the mechanical interface like joint traction, opening of the foramen, muscle stretching and soft tissue treatment. 17/20 teach techniques directed to the nerve like nerve gliding, nerve tension. 11/20 teach techniques directed to the nerve like contralateral nerve techniques.

QUESTIONS ABOUT THE NEURAL SYSTEM THAT NEED TO BE CONSIDERED DURING EXAMINATION

- OMT examination should exclude “red flags” and early answer the question if the nervous system is causing, or is a part of, the pain problem. Also screen for autonomous nervous system involvement.

- Primary vital signs (Body Temperature, Heart Rate/Pulse, Respiratory Rate and Blood Pressure) might be examined if necessary.

- It is important to first rule out a neuropathic pain condition since it needs medical attention. Neuropathic pain conditions can be caused by central or peripheral nervous system pathology. Remember it´s common with “mixed pain” conditions.

- During neurological examination test the sensory and motor function to determine if the nervous system is impaired. Findings of impaired function might be a contraindication or consideration for further manual examination and/or treatment of the movement system.

- In both central and peripheral nervous system conditions abnormal neurodynamic findings also might be a contraindication or consideration for further manual examination and/or treatment of the movement system.

- During examination of red flags and/or facial pain syndromes and/or shoulder pain syndromes examination of cranial nerves might be necessary. Some useful information is found on http://www.physio-pedia.com/Cranial_Nerves

MOBILITY OF NEURAL TISSUE, A NEED FOR AN UPDATE

The standard for neural examination basically follows the OMT evaluation described in Manual Mobilization of the Joints, volume II, The Spine 2012. Thus, we have some suggestions for an updated standard for the neurodynamic examination and treatment.

We suggest that some new updated thoughts to be integrated in the K-E OMT neural standard:

- Nerves are mechano sensitive when given enough force
- Normal nerves hurt if you pull or push hard enough on them
- Thus we suggest to use the terms normal and abnormal instead of positive and negative findings
- Normal response (ROM, typical region of symptoms, typical symptoms)
- Standard Sequence
- Standard tests
- Classification of response
- Planning of examination and treatment, level 0-3 according to Shacklock
- Contralateral testing and treatment

An explanation of testing and treatment procedures follows below under “Mobility of neural tissue”.

EXAMINATION OF RED FLAGS AND PATHOLOGY OF THE CENTRAL NERVOUS SYSTEM

- Medical history
- Inspection
- Screening for hypotrophy, weakness, etc.
- General health: Operations, trauma, sleeping disorders, osteoporosis, epilepsy, diabetes
- Vertebrobasilar insufficiency (5Ds, 3Ns)
- Cauda Equina syndrome (https://www.youtube.com/watch?v=8rRq5QqoK3o)
- Myelopathy
- Multiple Sclerosis – positive Lhermitte's sign
- Acute foot drop plegia
- Sudden weight loss
- Hypertonic test - quick passive movements, spasticity (clasp knife phenomenon, clonus, hyperreflexia), rigidity (lead pipe phenomenon)
- Romberg
- Babinski's sign
- Heel-knee
- Finger-nose
- Cranial nerves

EXAMINATION OF THE AUTONOMIC NERVOUS SYSTEM

- Symptoms: Sweating, hair growing, increased heart rate, shallow breathing, constipation, sleeping disorders, fatigue – Buijs (2013) and Robertson (2012).
- Diseases: Complex regional pain syndrome or Reflex sympathetic dystrophy, fibromyalgia, (http://www.fibromyalgia-symptoms.org/)
- Hypomobility of the thoracic spine might cause ANS symptoms.

EXAMINATION OF NEUROPATHIC PAIN

- Definition of neuropathic pain, (www.iasp.com)
- An injury to the somatosensory nervous system.
- Perform a standardised bedside examination of patients with suspected neuropathic pain.
- Kaltenborn page 107 Neurologic evaluation of nerve root syndromes.
- Screening questionnaires for evaluation of neuropathic pain might be useful, for example:
  DN4 - Bouhassira (2005)
  S-LANSS – Bennet (2005)
  PainDETECT - Freynhagen (2006)

NEUROLOGICAL EXAMINATION

(Kaltenborn, The Spine, Page 107-112.)

Sensory testing (light touch, pinprick, vibration, and position sense).

Motor testing (Muscle strength and endurance testing, including resisted repeated tests. Especially key muscles, girth measurements, deep tendon reflex testing).

Interface tests. Effect of compression and decompression on the nervous system

Mobility tests (Neurodynamic tests - NDT). Testing nerve entrapment and mechanosensitivity.

These tests are mainly used for the evaluation of peripheral nervous system (including cranial nerves).

MOBILITY OF NEURAL TISSUE – NEURODYNAMIC TEST (NDT)

1. Inform the patient about the manoeuvre and get the patient's permission

2. Select the correct NDT according to:

- Patient's clinical presentation: select the relevant nerve to be tested
- Severity of pain: select the best way to reduce the excessive stress on neural tissue. Possibilities are:
    - Acute patient with severe symptoms and contraindication for large movements:
        - Actively
        - Unload patient's position
        - Moving the area of the problem at the end (concept of neurodynamic sequencing)
    - Less acute or chronic patients that tolerate large movements:
        - Passively
        - Load patient's position
        - Moving the area of the problem first (concept of neurodynamic sequencing)

3. Performing the NDT

- Perform neurodynamic test/neural mobility test to point of onset of symptoms (P1) or resistance (somewhere between R1 and R2) or both
- Based on the location of symptoms, decide which end of the test to move for structural differentiation (proximal or distal).
- Perform structural differentiation to ascertain if the test is positive. Note that this does not describe whether it is abnormal at this stage
- Return to the neutral position

4. Interpretation of a positive/abnormal NDT (Kaltenborn and Shacklock)

Some positive or abnormal signs to NDTs include:

- Reproduction of specific symptoms
- Change in symptoms with structural differentiation for neural structures
- Asymmetrical range of motion, resistance or pain
- Significant limitation in range of motion

TEST OPTIONS FOR NERVE MECHANOSENSITIVITY

- Tension test (Neurodynamic test)
- Change the sequence (ex: local)
- Compress or decompress the nerve with closing or opening the interface
- Neural palpation (compression) in various degrees of neural tension

If you push hard and long enough any nerve can hurt.

STANDARD NEURODYNAMIC TESTS

- **UPPER LIMB NEURODYNAMIC TESTS**

Median nerve test:

Kaltenborn/Evjenth – How to fully lengthen the nerve: Shoulder girdle retraction and depression, shoulder abduction, extension and ext. rotation, elbow extension, forearm supination, wrist extension, finger extension. Cervical spine opposite LF and rotation. First arm is moved, then the cervical spine.

Standardized Sequence - Lohkamp (2010): Stabilize the scapula in neutral position, shoulder abduction, external rotation, forearm supination, wrist and finger extension (especially first three fingers), elbow extension.

Structural differentiation: wrist or neck opposite LF, depends on where symptoms occur (farthest joint from symptoms).

Normal response: Pulling at the radial side of the forearm, from the elbow to the first three fingers.

MNT2 standard sequence (if shoulder dysfunction is present) - Shacklock, (2005): Patient is positioned diagonally on the table that the scapula is outside. Scapula depression, elbow extension, shoulder external rotation/ forearm supination, wrist and finger extension, shoulder abduction.

Structural differentiation: release scapula depression or wrist extension depends on where symptoms occur (farthest joint from symptoms).

Normal response: pulling from the anterior part of the elbow to the first three fingers.

Radial nerve test:

Kaltenborn/Evjenth - How to fully lengthen the nerve: Shoulder girdle retraction and depression, shoulder abduction, extension and internal rotation, forearm pronation, wrist flexion and ulnar deviation, finger flexion. Cervical spine opposite LF and rotation. First arm is moved, then the cervical spine.

Standardized Sequence - Lohkamp (2010): Patient is positioned diagonally on the table that the scapula is outside. Scapula depression, elbow extension, shoulder internal rotation/ forearm pronation, wrist and finger flexion, shoulder abduction.

Structural differentiation: release scapula depression or wrist flexion depends on where symptoms occur (farthest joint from symptoms).

Normal response: Pulling in the lateral side of the elbow extending into the forearm. Sometimes stretching in the dorsum of the wrist.

Ulnar nerve test:

Kaltenborn/Evjenth – How to fully lengthen the nerve: Shoulder girdle retraction and depression, shoulder abduction, extension and ext. rotation, elbow flexion, forearm supination or pronation, wrist extension and radial deviation, finger extension. Cervical spine opposite LF and rotation. First arm is moved, then the cervical spine.

Standardized Sequence – Flanagan M., (1993): Scapula depression, wrist and finger extension (especially last two fingers)/ forearm pronation, elbow flexion, shoulder external rotation, shoulder abduction.

Structural differentiation: release scapular depression.

Normal response: from the elbow, ulnar side of the forearm, till hypothenar and 4^{th} and 5^{th} finger.

- **LOWER LIMB NEURODYNAMIC TESTS**

NEURODYNAMIC TESTS FOR RADICULOPATHIES

Sciatic nerve test: (STRAIGHT LEG RAISE)

Kaltenborn/Evjenth - How to fully lengthen the nerve: hip flexion, knee extension, ankle dorsiflexion, neck flexion.

Standardized Sequence – Herrington et al. (2007) and Boyd (2012): Hip flexion with a straight knee.

Structural differentiation: use dorsiflexion or release hip flexion depending on where symptoms occur (farthest joint from symptoms).

Normal response: Pulling in the posterior thigh that spreads into the posterior knee and sometimes into the upper third of the calf. The ROM varies between 50° - 100°.

Sciatic nerve test (standing or sitting):

Kaltenborn/Evjenth - How to fully lengthen the nerve: hip flexion, knee extension, ankle dorsiflexion, spinal flexion.

Standardizing Sequence (Slump Test) - Herrington et al. (2007) and Shacklock (2016): Hip flexion of 90°, thoracic and lumbar flexion (without more hip flexion), cervical flexion, knee extension, ankle dorsiflexion.

Structural differentiation: release neck flexion.

Normal response: posterior thigh or posterior, superior calf.

Femoral nerve test (Prone knee bend, femoral slump):

Kaltenborn/Evjenth - How to fully lengthen the nerve: hip extension, knee flexion, ankle PF, neck flexion.

Standardized Sequence (Femoral Slump) - When-Hang et al. (2012): Shacklock Prone knee bend test standard sequence: Knee flexion.

Structural differentiation: preventing the lumbar extension by keeping the sacrum in counter nutation. Alternatively, with neck flexion (patient prone and head outside the treatment table OR patient side lying).

NEURODYNAMIC TESTS FOR FOCAL NEUROPATHIES

Tibial neurodynamic test:

Indications: Tarsal tunnel syndrome. Shacklock standard sequence: Foot DF/eversion, toes extension, straight leg raise (hip flexion w knee extended).

Structural differentiation: less hip flexion.

Local sequence in standard testing because symptoms are not easy to provoke.

Normal response: Stretching in the calf region that often extends into the medial part of the ankle and plantar surface of the foot. Normal hip flexion: between 30° and 70°.

Peroneal neurodynamic test (superficialis and profundus together)

Indications: Ankle sprain. Shacklock standard sequence: Foot PF/inversion and toes flexion, straight leg raise.

Structural differentiation: less hip flexion.

Local sequence as a standard.

Normal response: Stretching in the anterolateral lower leg, ankle and dorsum of the foot.

Sural neurodynamic test

Indications: Ankle sprain. Shacklock standard sequence: Foot DF/inversion, toes extension, straight leg raise.

Structural differentiation: less hip flexion.

Local sequence as a standard.

Normal response: Stretching in the posterolateral ankle region and sometimes spreading into the posterolateral calf region. Normal hip flexion: between 30° and 60°.

TREATMENT OF NEURAL AND NEURODYNAMIC CONDITIONS

Acute patients:

The objective of the treatment at this stage is to diminish the swelling of the neural tissues.

We use decompressive movements in order to alleviate the excessive pressure on neural structures. We use neural resting positions and nerve sliders. The dosage must follow the patient's responses and the relevant sign.

- Decompressive movements: traction and interface "openers":
    - Intermittent traction in antalgic or actual resting position: is the safest and often the most effective treatment. Grade I and II (SZ) traction mobilization in the actual resting position can reduce nerve root irritation by improving metabolic exchange via the vascular system and by improving drainage of waste products from the inflamed nerve tissue.
    - Interface openers: The aim of the interface openers is to restore the blood flow so that the nerve can receive oxygenated blood and to decrease inflammation. To do this, move the interface structures in a way that diminishes the pressure on the nerve. E.g. for the nerve roots, flexion, contralateral side bending and contralateral rotation of the spine are the opening movements.

- Neural resting positions: consist of placing the joints in a position that produces the lowest tension on the affected neural structures. This can be recommended as a home position. I.e. opposite to neural tension movements.
    - Contralateral neurodynamic position: to get the maximum relaxation of the nerve roots, the contralateral limb could be placed in a neural tension position. Recent studies have shown that adding tension to the nerve roots in the contralateral side can decrease tension in the affected nerve root.

- Neural Sliders:

Neural slides are techniques that produce considerable movement of nerve, but without creating too much tension or compression. Therefore, techniques are given to reduce pain and improve mobility neural.

A longitudinal force is applied at one end of the tension nerve tract while the other end is released. In an attempt to reduce tension, the nerves slide the point at which the voltage is applied (to the gradient of pressure), thus sliding longitudinally.

- Neural Tensioners:

Neural tensioners are techniques are given to improve neural mobility when the nervous system ROM is decreased and slight or moderate pain or acute (physiological) symptoms are present. A longitudinal force is applied at both ends of the nerve.

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Section 4: Exercise and Training

BACKGROUND

K-E OMT Exercise and Training section of the Standards committee was joined at the conference in Zaragoza 2015. The Exercise and Training section of the standards committee is represented by Lasse Thue (Norway), Jutta Affolter (Switzerland), Alazne Ruiz and José Miguel Tricás (Spain), Panagiotis Aligizakis (Greece), Martin Weiddinger (Austria), Miguel López (Mexico) and Diana Ponner (USA).

In spite of the discussion, the section has not reached a consensus written document for this section of the standard. Apart for the course handout from Lasse Thue, other materials have appeared recently like Folsom Program´s books about rehab training so there is a need of more work to integrate all these sources in a consensus document.

Section 5: Symptom Localization

K-E OMT Symptom localization Section of the Standards committee was joined at the conference in Zaragoza 2015. The anatomical joint section of the standards committee is represented John Krauss, PT, PhD, OCS, OMT, FAAOMPT, Miguel Malo, PT, PhD, OMT, Christian Gloeck, PT, OMT, Martin Langaas, PT, OMT

The KE-OMT Symptom Localization advisory panel have been tasked by the KE-OMT Executive to develop a document describing the educational and practice standards for symptom localization.

Preface

The advisory panel acknowledges that symptom localization may be defined from a broad perspective, which includes all portions of the physical examination that focus on patient symptoms and subsequent decision-making processes used to clarify the patient diagnosis relating to symptoms. This broader definition includes typical physical therapy tests and measures which are considered special tests in an entry-level curriculum in addition to KE-OMT specific symptom localization tests. The advisory panel also acknowledges that content relating to symptom localization included within entry level educational programs often differs between educational institutions within as well as between countries. Based on these facts, and a lack of clear information regarding the educational and practice levels of clinicians using symptom localization, the advisory panel will limit its current recommendations to techniques and processes specific to KE-OMT and not the broader definition of symptom localization. Included in this recommendation are symptom localization tests which have been recorded in a variety of media including print media and multimedia as well as those observed during laboratory or clinical instruction with KE-OMT patrons Freddy Kaltenborn and Olaf Evjenth

Symptoms versus Pain – Pain is likely the most common reported symptom investigated by symptom localization. While the sources of pain may be described from a neuroreceptor standpoint, the experience of pain is a much more individually dependent characteristic. Included in this experience are emotional, cognitive, and social factors which include memory, learning, and context. Because of this, some patient's may report symptoms that are similar to pain but are not recognized as pain by the individual. The term symptom encompasses this larger context, even though pain may be the most common symptom reported by patients.

***This document is not intended to serve as a stand-alone teaching tool for the practice of symptom localization. Individuals interested in studying symptom localization should consult the references identified in the reference section of this document.**

Process for Development of the Symptom Localization Standard

References reviewed for the section included the Evjenth & Gloeck 1997 reference, related sections from the latest editions of Kaltenborn's Manual Mobilization of the Joints Vol I & II, excerpts relating to symptom localization from Krauss' 2013 book chapter on the Kaltenborn-Evjenth Concept, related sections of the Myofascial Mobilization and Self Mobilization text by Tricás et al., a review of the literature with a focus on pain and neural pathways, and relevant teaching materials and notes from the expert panel developing this document.

Key Terms & Definitions

Symptom Localization – For the purposes of this document symptom localization is defined as "A systematic orthopedic examination process used to identify body regions, spinal segments, and body structures which may be the source or sources of a patient's chief complaint."

Mechanosensitivity – When symptoms experienced by patients are influenced by movement or load. Mechanosensitivity is a prerequisite for the use of symptom localization testing. Mechanosensitivity may be increased or decreased by factors such as anxiety, depression, stress, fear, and expectation.

Verge of Symptoms – The point within a movement or position just prior to the onset or increase in patient symptoms.

Point of Symptoms – The point within a movement or position just after the onset or increase in patient symptoms.

Provocation Test – Tests that increase symptoms when applied.

Alleviation Test – Tests that reduce symptoms when applied.

Somatic Pain - Somatic pain occurs when pain receptors in tissues (including the skin, muscles, skeleton, joints, and connective tissues) are activated. Typically, stimuli such as force, temperature, vibration, or swelling activate these receptors. This type of pain is often described as cramping, gnawing, aching, or sharp. Somatic pain is often localized to a particular area and stimulated by movement. Somatic pain may be further divided into superficial or deep. Superficial pain, occurs when pain receptors in the skin, mucus, and mucous membranes are activated. Common, everyday injuries usually cause superficial somatic pain. Deep somatic pain occurs when stimuli activate pain receptors deeper in the body including tendons, joints, bones,

and muscles. Deep somatic pain usually feels more like “aching” than superficial somatic pain. Additionally, somatic pain can be confined locally or spread across larger areas of the body depending on the extent of the injury.

Visceral Pain - Pain that results from the activation of nociceptors of the thoracic, pelvic, or abdominal viscera (organs). Visceral structures are highly sensitive to distension (stretch), ischemia and inflammation, but relatively insensitive to other stimuli that normally evoke pain such as cutting or burning. Visceral pain is diffuse, difficult to localize and often referred to a distant, usually superficial, structure. It may be accompanied by symptoms such as nausea, vomiting, changes in vital signs as well as emotional manifestations. The pain may be described as sickening, deep, squeezing, and dull.

Neuropathic Pain - Pain caused by damage or disease affecting the somatosensory nervous system. Neuropathic pain may be associated with abnormal sensations called dysesthesia or pain from normally non-painful stimuli (allodynia). It may have continuous and/or episodic (paroxysmal) components. The latter resemble stabbings or electric shocks. Common qualities include burning or coldness, "pins and needles" sensations, numbness and itching.

Pain Threshold – Point within the range of motion or loading/unloading motion where the patient feels a distinct onset or increase in pain or symptoms.

Indications for the use of Symptom Localization

The use of Symptom Localization is indicated for patient’s experiencing symptoms that are (1) deep somatic in quality (achy), (2) may be either local or spread across larger body areas, and (3) are not associated with an obvious region, segment, or structure.

Patient’s must be alert and oriented, must have symptoms which are associated with a body position and/or movement, and must be able to verbally describe their symptom as well as identify what activity or position changes their symptom in any manner (typically in degree, location, or in some cases quality).

Contraindications for the use of Symptom Localization

Symptom localization is rarely contraindicated, however, cases may present where the OMT feels that a patient's biopsychosocial status may be significantly worsened by the application of symptom localization. Examples of such cases include patients who are recovering from acute orthopedic injuries or recent orthopedic surgery, or are experiencing heightened levels of fear or anxiety. In addition, there are instances where the application of symptom localization may be considered inefficient or unnecessary such as when (1) the *mechanism* of injury indicates a clear source of symptoms, (2) the *nature of symptoms* indicate a clear segment, structure or region generating symptoms, and (3) symptoms do not *significantly* change with position, load, or movement.

Types of Symptom Localization

Regional Localization - Regional localization is used to identify regional origins of referred symptoms. Examples of regional localization tests include (1) traction and compression, (2) differential movements between adjacent regions in a kinetic chain, (3) provocation/alleviation of multiregional structures such as peripheral nerves.

Segmental Localization – Is used to identify spinal segments generating local or referred symptoms. Performed exclusively in the spinal column.

Structural Localization - The advisory panel suggests that the principle focus for structural localization testing be confined to tissues which are more difficult to differentiate from a symptom standpoint. More specifically, in this document, structural localization will focus on structures which generate deep somatic pain such as tendons, joints, bones, muscles and nerves. With this stipulation in mind, structural localization is used to identify pain originating from (1) musculotendinous structures, (2) anatomical joint structures (intra & extra articular), and (3) neurological structures.

*In some countries, the term *Specific Localization* is used which encompasses the process of identifying spinal segments and extremity joints generating local or referred symptoms. Using the above terminology Specific Localization would be split between Segmental Localization and Structural Localization. For the purposes of this document we will use the terminology of regional, segmental, and structural localization however the term Specific Localization is also acceptable within the standard.

**A complete listing of the both the broader and more focused categories of symptom localization are included in Table 1. The panel recommendations regarding the inclusion of individual categories or individual tests into the KE-OMT Core curriculum is indicated under the final column titled KE-OMT Core.

Selecting Symptom Localization Tests During the Patient Examination

The advisory panel recommends the use of symptom localization as indicated previously in this document. With regards to the specific type of localization which should be performed, the panel recognizes that the patient presentation will provide the context for such a selection.

Symptom Localization Type	Indication Examples
Regional Localization	***If*** (1) there is no clear mechanism of injury, (2) symptom location, quality and mechanism do not match, (3) symptoms are located at the junction of extremities (and neck) with the trunk, (4) symptoms are located along common nerve pathways, or (4) when prior treatment of local tissues has not resulted in expected improvement ***then*** regional localization testing may be indicated
Segmental Localization	***If*** symptoms are localized to the spine, however the specific spinal level is unclear ***then*** segmental localization may be indicated
Structural Localization	***If*** the region, or segment has been identified but the specific structure or structures causing the symptoms is unclear ***then*** structural localization should be performed

Provocation and alleviation tests may be applied within each of the symptom localization types. Provocation may be the most efficient and effective starting test when the patient's symptoms are mild to moderate in intensity, clearly identified, and consistent in onset in terms of position and/or movement and/or load. In contrast, alleviation may be the most efficient and effective starting test when the patient's symptoms decrease when the same position is maintained, or when the position or load that causes symptoms is difficult for the patient to identify. In cases where patient symptoms are mild to moderate in intensity and further confirmation is desired, then regardless of which test is performed first, the opposing test may be performed as a follow-up to assist in verifying the source of symptoms.

Regardless of which category of symptom localization is selected as a starting point within the physical examination, the KE-OMT practitioner should be adept in moving between the various categories and symptom localization tests as needed to clarify sources of symptoms while examining, evaluating and diagnosing the patient's source of symptoms.

Performing Symptom Localization

Cyriax's selective tissue tension testing

For a detailed description of Cyriax's selective tissue tension testing schema please consult Kaltenborn's Manual Mobilization of the Joints Vol. I & II.

Evjenth's symptom localization testing

Examples of symptom localization testing developed by Evjenth or developed using Evjenth's principles are available from multiple resources including the Evjenth & Gloeck's symptom localization text, Tricas et al. Manual Mobilization text, Krauss' book chapter all of which are included in the reference section of this document.

Basic application overview (greater detail available in the reference texts)

1. Begins during the patient interview where symptom characteristics such as intensity, quality, location and timing are gathered.

2. Based on the history, movement or positions are observed, and the pain threshold is identified.

3. Symptoms and movements which are the most dynamic (changeable) are chosen for the symptom localization testing and are matched with a symptom localization type (Regional, Segmental, Structural).
4. Within the symptom localization type a provocation or alleviation test is selected.
    a. Provocation is performed with the patient positioned at the verge of symptoms.
    b. Alleviation is performed with the patient positioned at the point of symptoms.
    c. Provocation and alleviation tests should be sequenced to *implicate one region, structure or segment at a time*.

5. If the selected test provokes or alleviates as expected then the opposing test is typically performed as confirmation.
    a. In certain cases, it may be necessary to *pre-sensitize* the patient to elevate symptoms to a level where patients can accurately identify the verge of symptoms and point of symptoms.
        i. Examples include the following:
            1. If pain occurs after 30 minutes of sitting then the patient may need to sit 30 minutes before the use of symptom localization.
            2. If pain occurs after walking 1 mile then the patient may need to walk 1 mile before the use of symptom localization.
            3. If pain occurs after looking up for 10 minutes then the patient may need to look up 10 minutes before the use of symptom localization.

6. If the test does not provoke or alleviate as expected then the position or movement is repeated to refine the verge or point of symptoms and the test is repeated.

7. If repeating the test does not indicate a region, segment, or structure then another symptom localization test may be selected and performed.

8. Once the KE-OMT practitioner is satisfied that they have identified the source of the patient's symptoms they should continue examining for relevant functional limitation and movement impairments

Table 1: Symptom Localization Tables

Regional Localization Examples					
Region	**Tests**	**Positions**	**Difficulty Level**	**Reference**	**KE-OMT Core**
Cervical (upper) versus cervical (lower)	• Flexion – Extension • Rotation • Side Bending + Rotation	Seated	Introductory	1. Evjenth & Gloeck pages 6-8	Yes
Cervical versus thoracic	• Traction & Compression • Rotation • Flexion - Extension	Seated	Introductory	1. Evjenth & Gloeck	Yes
Cervical versus shoulder	• Traction & Compression (at rest, with resistance, with AROM)	Seated	Introductory	Observed during coursework with Olaf Evjenth	Yes
Thoracic versus rib	• Thoracic rotation vs rib compression - traction	Prone	Intermediate	1. Evjenth & Gloeck pages 13, 21-22,	Yes
Lumbar versus hip versus SI	• Traction & Compression, • Rotation • Flexion – Extension • Side bending	• Standing (Traction-Compression • Rotation • Flexion – Extension • Side Bending (SI & Hip))	• Introductory – All except intermediate techniques • Intermediate – Rotation in standing, side bending in	1. Evjenth & Gloeck pages 24-29	Yes

		• Prone (Rotation & Side Bending)	standing		
Hip versus knee	• Traction & Compression • Femoral Rotation	• Standing • Prone	Introductory	1. Evjenth & Gloeck pages 36-37	Yes

Segmental Localization Examples					
Regions	**Tests**	**Positions**	**Difficulty Level**	**Reference**	**KE-OMT Core**
• Upper cervical • Lower cervical • Thoracic • Lumbar	Flexion - Extension	• Seated (Cervical – Thoracic) • Standing (Lumbar)	Introductory - All	1. Evjenth & Gloeck pages 10-11, 14-15, 24-27	Yes
• Upper cervical • Lower cervical • Cervical • Thoracic • Lumbar	Rotation	• Seated (cervical, Thoracic) • Standing (lumbar) • Prone (thoracic, lumbar)	• Introductory – Seated cervical (active motion), prone thoracic & lumbar • Intermediate – Seated Cervical (passive overpressure) • Advanced – Standing lumbar	1. Evjenth & Gloeck pages 9, 12, 16, 28-29	Yes
• Thoracic • Lumbar	Side Bending	Prone (with Prepositioning)	Advanced		Not at this time but recommended for future inclusion

Rib cage	Breathing	Sitting	Advanced	1. Evjenth & Gloeck pages 17-20	Yes

Structural Localization Examples					
Structures	**Tests**	**Positions**	**Difficulty Level**	**Reference**	**KE-OMT Core**
Articular	• *Traction & Compression • Related articular gliding movements	Various	• Introductory – Compression & Traction, Flexion – Extension • Advanced – Side Bending, Rotation	1. Evjenth & Gloeck pages 31-35, 38-40 2. Kaltenborn MMJ vol. II Spine – pages 162-163, 212-216, 259	Yes
Integumentary	• Pressure sensitivity • Movement sensitivity	Various	Introductory		Not at this time, but considered a basic orthopedic examination skill
Muscular	• Active contraction • Passive elongation • Muscular palpation	Various	Introductory	1. Kaltenborn MMJ vol. I Extremities – pages 46-49 2. Tricás Myofascial Mobilization and Self-Mobilization in OMT. Vol. I – pages 12-28	Yes
Neural	• *Neurodynamic testing (neural symptom component)	Various	• Introductory for large nerves (e.g. Sciatic,	1. Evjenth & Gloeck page 23 2. Kaltenborn MMJ vol. II	Yes

	• Neural palpation		Femoral, Radial, Ulnar, Median) • Intermediate to advanced for smaller nerve branches	Spine – pages 164-173, 260-263, 266	
Vascular	• *Vertebral artery test • TOS tests • Homan's Sign	Various	Introductory	2. Kaltenborn MMJ vol. II Spine – page 267	Vertebral artery testing considered part of the core. TOS and Homan's sign considered basic examination skills
Visceral	• Murphy's percussion • McBurney point palpation • Obturator or Iliopsoas tests for abscess (Heel tap, Hop test) • Blumberg's Sign	Various	Introductory		Not at this time, but considered basic orthopedic examination skills

References (Listed in Alphabetic Order)

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3. Kaltenborn, Freddy. The Spine: Basic Evaluation and Mobilization Techniques, 6th Edition or higher. Olaf Norlis Bokhandel: Oslo, Norway, 2012. ISBN:82-7054-052-8.
4. Kaltenborn, Freddy. Manual Mobilization of Extremity Joints: Basic Examination and Treatment Techniques, 8th Edition. Olaf Norlis Bokhandel: Oslo, Norway. ISBN: 82-7054-043-9. OPTP: 1-800-367-7393
5. Tricas JM., Hidalgo C., Lucha O., Evjenth O. Myofascial mobilization and self-mobilization in OMT. Volume I: The Extremities. OMT Spain: Zaragoza, Spain, 2015