Solutions For Movement Impairments Of The Lower Quadrant:

a manual therapy based case study

Koen Schoolmeesters,
MSc Physiotherapy, Manual Therapist
Kinetic Control Accredited tutor
Introductie

- Kinesitherapeut KUL FaBeR
- Manueel Therapeut SOMT ‘98, .......
- Groepspraktijk voor kinesitherapie en manuele therapie Move To Heal
- Assistent Manuele Therapie FaBeR – KUL
- Kinetic Control Accredited Tutor 2006

Product van MPS
- Internationaal onderwijs-/bijscholingsteam
- 1995 – > 20 years !!
- Chichester, UK
- Comerford Mark & Mottram Sarah
- Evidence based concept
Movement Performance Solutions

Mission Statement

Through innovative, evidence-based solutions, Movement Performance Solutions educates and trains professionals in sport, health, fitness and rehab to enhance movement efficiency and better understand how to prevent and manage musculoskeletal injury and pain that can affect movement and compromise performance in their patients, players and clients.

http://www.movementperformancesolutions.com/
http://www.kineticcontrol.com/
http://www.theperformancematrix.com/
Movement Health
• Instability (structural-functional)
• Stability dysfunction
• Give
• Maladaptive movement pattern
• Motor control dysfunction
• Movement dysfunction
• Control impairment
• Movement control impairment
• UnControlled Movement UCM
stated that “physical therapists treat movement-related impairments rather than structural anatomical abnormalities. As such, using a pathoanatomic model to define physical therapy-related diagnostic labels creates a disconnect between our diagnostic and treatment processes.”

There is clearly a growing recognition that pathokinesiological problems are a significant source of musculoskeletal pain that should be addressed rather than exclusively focusing on pathoanatomic problems.

If we are able to successfully define the components of

Patho-anatomic to patho-kinesiology to kinesio-pathology
(Sahrmann)
This module supplies a route to address movement impairments, influencing presence of pain, recurrence of pain and function.

Is pain or dysfunction a ‘downstream’ process of presence of movement impairments?
In the presence of chronic or recurrent musculo-skeletal pain

- Subjects employ strategies or patterns of synergistic recruitment that are normally reserved for **high load function** (mobiliser dominant)

  ... to perform **low load** postural control and normal non-fatiguing functional movements

Altered Strategies

These altered strategies are referred to in the research and clinical literature as:

- Substitution strategies
- Compensatory movements
- Muscle imbalance
- Faulty movements
- Co-contraction rigidity
- Control impairments
Hitching during unloaded hip flexion is a compensation in this patient with groin pain.

Ideal

Dysfunctional global stabiliser?
Stabiliser/Mobiliser recruitment patterns

**Painfree (normal / ideal)**

Significant pain related change with low load ...
? need to emphasise low threshold re-training
In the presence of chronic or recurrent musculo-skeletal pain

• These high load strategies... to perform low load postural control
  • are reversible with low threshold training
  • High load training (if it is the only training) is likely to re-enforce or maintain this state
  • There is often no need to stop high load training
    ... just add low threshold motor control training

Cause – consequence?
Decreased Variability in young people with NS-LBP

Study 1 (cross sectional)

Decreased variability in postural control strategies in young people with NS-LBP is associated with altered proprioceptive reweigthing

Claeys K, Dankaerts W, Brumagne S e.a.,
European J of Applied Physiology 2011; 111 : 115-123
Postural control strategy - STANDING
Variability in proprioceptive postural control

- **ankle strategy** - the inverted pendulum control model: rigid segments moving around 1 joint: esp by calf muscles

- **multisegmental control model**: multiple corrections at different joints and vertebrae by the deep segmental spinal muscles – most optimal

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**Fig. 3.** An ankle-steered postural strategy (A) and a multisegmental steered postural strategy (B) in combination with their impact on the spine.
Sensory reweighting and LBP

• Non injured subjects can shift relatively quickly from one postural strategy to another

• LBP subjects use the same control strategy regardless the condition, compensating for the sensory deficit
  • ‘One strategy all fits’ (Hodges)
Sensory reweighting and LBP

Persons with recurrent LBP

• prefer significantly ankle muscle proprioceptive control for both standing without foam and on foam compared to healthy individuals

Brumagne e.a. 2008, Persons with current low back pain exhibit a rigid postural control strategy, Eur Spine J 17 : 1177-1184
Postural control strategy – Variability in proprioceptive postural control

STANDING + VIBRATION

**LBP** : larger Bw sway in triceps vibration

More reliance on ankle signals during stable standing conditions

**Ankle-steered strategy**

Less reliance on LB signals during unstable conditions where the LB signals are expected to play a predominant role in postural control

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![Muscle vibrator](image)

**Without vision**

**Standing with vision occluded**

- **LBP** : less (expected) Fw sway in LM vibration

- Less reliance on LB signals during unstable conditions where the LB signals are expected to play a predominant role in postural control.
• decreased variability of movement strategies
• Lack of choices
• Habitual movements
• Sustained positions
Prospective study 4: Young individuals with a more ankle-steered proprioceptive control strategy may develop mild non-specific low back pain.

Claeys K, Dankaerts W, Brumagne S e.a.,
European J Electromyogr Kinesiol 2014
People with a dominant ankle proprioceptive use in unstable standing showed an almost four times higher risk to develop LBP in the future. This indicates that, in this young population with mild LBP,

- LBP may be caused by a different proprioceptive weighting and
- that the observed differences in proprioceptive postural control were not only the result of pain which was frequently suggested in earlier cross-sectional studies.

High reliance on ankle proprioceptive inputs and a reduced ability to adapt this proprioceptive use when necessary (on foam) in people who develop LBP may result in a less-tuned spinal control during postural tasks with mechanical stress, spinal injury and pain as consequence.
NO risk for developing or sustaining mild LBP within 2 years – comparing NoLBP-LBP vs NoLBP-NoLBP

- increased postural sway (force plate, w/o vibration)
- postural differences in usual standing and sitting

- psychosocial variables (4DQ 4 Dimensional Questionnaire – FABQ Fear-avoidance Beliefs Questionnaire <14 – TSK Tampa)

- physical activity level (FAI Physical Activity Index)
Development Links

**Kinetic Control:**
- Systematic analysis of movement and function
- Evidence based
- Development of clinical assessment of stability dysfunction (based on low threshold recruitment efficiency)
- Diagnosis of movement dysfunction
- Development of principles of stability training
- Local & global motor control testing & Rx
- Clinical reasoning led exercise prescription
- Integrated 'Core Stability' retraining
- Application of Ax & Rx to the whole body

**Motor Control Research & Training Model:**
- Hodges, Jull, Richardson
  - local spinal control
  - global trunk stability

**Stretching & Strengthening**
(Historical Developments)

- Sahrmann: global - whole body
- Janda: global - trunk & limbs

**Muscle Balance:**
- Restrictions & Compensation

**Flexibility:**
- Contractile tissue
- Connective tissue

**Performance Stability:**
- 'Performance Matrix' (evidence based)
- Assessment of low & high force performance function
- Systematic analysis of performance 'weak links'
- Development of risk management (assessment and correction)
- Integrated multi-dimensional core stability training
- High standard training and accreditation

**'Traditional' Strengthening:**
- Overload training
  - power & endurance

**'Core' Strengthening:**
- (McGill)
  - Overload training
  - Trunk & girdles

**Model of Clinical Movement Analysis & Movement Dysfunction Diagnosis**
- Sahrmann (Direction Susceptible to Motion)
- Kinetic Control (Site & Direction of Uncontrolled Motion)
- O'Sullivan & Dankaerts (Control Impairment)

**Analysis of 'Alternative' Therapies & Approaches**

**Task Specific Training & Functional Integration**

**Stretching & Strengthening**
(Historical Developments)
‘Alternative’ Approaches:
- common features

- multi-joint movements
- slow movements
- low force movements
- large range movements
- co-ordination and control of rotation
- smooth transition of concentric ↔ eccentric movement
- concept of a ‘core’
- awareness of gravity
- awareness of posture
- co-ordinated breathing
- intermittent static hold of position
- control of the centre of mass of one body segment with respect to adjacent ones
- proximal control for distal movement
- positive mental attitude
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**Analysis of 'Alternative' Therapies & Approaches**

**Kinetic Control:**
- research literature review
- analysis & development of movement system model
  - research
  - clinical evaluation & application

**Muscle Balance:**
- Restrictions & Compensation
Local Stability Role/Strategy

• ↑ muscle stiffness to control segmental translation
• no or minimal length change in function movements
• +/- anticipatory recruitment in all directions prior to functional loading provides protective stiffness
• +/- activity is continuous and independent of the direction of movement
• proprioceptive input role

(review: Comerford & Mottram 2001)
A motor control deficit is present in subjects with low back pain. Anticipatory recruitment of transversus is significantly delayed. This results in stability failure. The timing delay is independent of the type or nature of pathology and persist long after the resolution of back pain. (Hodges & Richardson 1995, 1996)
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Movement Dysfunction +/- related to pain

“Faulty movements can induce pathology”

The path of least resistance

Patho-anatomic to patho-kinesiology to kinesio-pathology

(Shirley Sahrmann)
Relative Stiffness - Relative Flexibility

- Relatively flexible structures compensate for relatively stiffer structures creating direction related stress and strain.

- If 2 joint muscles lack extensibility or are overactive, they limit normal motion which must be compensated for elsewhere in the movement system.

- If 1 joint muscles lack ability to adequately shorten or are inefficient or “weak”, they allow excessive motion.
Path of least resistance

Move in the direction of least resistance
UnControlled movement
Range UCM

- Habitual movements
- Sustained positions
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**Analysis of 'Alternative' Therapies & Approaches**

**Task Specific Training & Functional Integration**
- 'Core' Strengthening: (McGill) overload training - trunk & girdles

**'Traditional' Strengthening:**
- Overload training - power & endurance
• Instability (structural-functional)
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1. ASSESSMENT

• The presence of movement control impairments identifies kinesio-pathological subgroups of patients within the musculoskeletal pain population.

• The identification of the site and direction of uncontrolled movement allows targeted and focused retraining to optimally manage pain and improve movement function.
Diagnosis of UCM

The site of uncontrolled motion

• is the site of movement control impairment

&

• is the most likely site of pathology and symptoms
  • because tissues around are excessively compressed, impinged, strained
Diagnosis of UCM

The direction of uncontrolled motion

• is the direction of movement control impairment

&

• is the direction of pain producing movements
  • Because it relates to the direction of tissue stress or strain
Thanks to Diane
2. REHABILITATION

• Movement retraining interventions that are matched to correcting specific impairments can improve the efficiency and cost effectiveness of decreasing recurrence and improving movement health

• Movement control retraining changes both central nervous system neurophysiology and peripheral tissue structure and function
It’s all about **cognitive retraining**, **not** about **exercises**!

Movement control retraining changes both

• CNS NFS and
• peripheral tissue structure and function
Movement Performance Solutions

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Models for diagnosis and classification of CLBP

1. Patho-anatomical model
2. Peripheral pain generator model
3. Neuro-physiological model
4. Psycho-social model
5. Mechanical loading model
6. Signs and symptoms model
7. Motor control model
8. Biopsychosocial model

Various Diagnoses for 1 patient!

1. Medical –

2. Anatomical – (‘complaining’ tissue/structure)

3. Manual Therapeutic – (restrictions, end feel)

4. Movement Control – (UnControlled Movement patterns, movement control impairment)

5. Neuro-Dynamic-

6. Psycho-social – Presenting pain mechanisms (sensitization, affective,...)
Pain and Restriction

- Articular restriction
- Myofascial restriction
- Neurodynamic restriction

The site of the pain refers to the site of the restriction

Manual therapeutic diagnosis
## Treatment Restrictions

<table>
<thead>
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<th>UnControlled Movement</th>
<th>Translational/Articular</th>
<th>Range/Myofascial</th>
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<td>• HVLA technique</td>
<td>• Active stretch</td>
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<td>• Neurodynamic mobilisation</td>
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</table>
Pain & Stability Dysfunction

- (give)
- movement impairment
- movement control impairment
- UnControlled Movement

The site of the pain refers to the site of the UCM

Movement control diagnosis
## Treatment UnControlled Movement

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**Movement control retraining**
It’s all about cognitive retraining, **not** about exercises!

Movement control retraining changes both

- CNS NFS and
- peripheral tissue structure and function
Objective

The site of the pain refers to the site of the restriction

And/Or

The site of the pain refers to the site of the UCM
Background Case Study
Best Clinical Practice

Components of Evidence-Based Medicine

- Patient Values and Preferences
- Best Evidence
- Clinical Expertise

Evidence-Based Medicine
In pursuit of the best possible outcomes
CLINICAL EXAMINATION
Case Study - History

- 54-year old recreational sportsman (long distance (speed) walking - hiking, strengthening exercises for back muscles, sometimes jogging)
- **symptoms**:
  - Low back-buttock pain left (LS-junction – SIJ region)
  - Intermittent pain dorsal thigh, muscle cramping left leg
  - Intermittent groin pain and ventral thigh pain (after jogging)
Case Study - History

- **Time frame**: 4 months
- **Reason**: move out parents house; also ‘missed a step’ by using the ladder (regional overload, no history of LBP)
- **Evolution**: no change
- **Provocation**:
  - LBP: sitting in train, sitting tall, turn around in bed, supine
  - Groin pain: walking, jogging (need to stop after 3 km)
- **Disability**: hiking, jogging
- **Medication**: -
• **Posture:**
  - tall 1.87m, athletic 54 yr man,
  - well trained leg- and back muscles, rather hypotone abdominal wall

• **Active lumbar movements:**
  - All Lx ROM restricted
  - flexion hip + Lx restricted ROM (> extension),
  - Lx extension (+ 3D extension homonymous left) provocative for LBP left
  - sidebend hinge Upper Lx
  - High ilia?
Various Diagnoses for 1 patient!

- **Medical** – Piriformis syndrome
- **Anatomical** – (‘complaining’ tissue/structure)
- **Manual Therapeutic** – (restrictions, end feel)
- **Movement Control** – (UnControlled Movement patterns, movement control impairment)
- **Neuro-Dynamic** –
- **Psycho-social** – Presenting pain mechanisms (sensitization, affective,...)
1. Patho-anatomical diagnosis
   pain producing tissue?

• Pain distribution – other Sx – NFS

• Differential diagnosis

• Selection of relevant clinical tests
Structural analysis

- hip ?
- Upper Lx – TLj ?
- SIG ?
- Lower Lx – LSj ?
What about Piriformis syndrome as pain producing tissue?

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Differential diagnosis</th>
<th>Tool - Test</th>
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<tbody>
<tr>
<td>[Diagram of Piriformis syndrome]</td>
<td>Piriformis syndrome</td>
<td>Length test: provocative test but piriformis not short</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No neurological signs</td>
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</tbody>
</table>
Quickly.....Exclusion of hip pathology

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<td>Hip (pre)artrosis</td>
<td>History -</td>
</tr>
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<td></td>
<td></td>
<td>Active movement -</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passive movement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capsular pattern –</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drehman sign –</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quadrant test -</td>
</tr>
<tr>
<td></td>
<td>Hip impingement (psoas bursitis, - tendinitis, ...)</td>
<td></td>
</tr>
</tbody>
</table>
Is SIJ pain producing structure?

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</tr>
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<tbody>
<tr>
<td>SIG</td>
<td>• dysfunction? • Instability? • UCM?</td>
<td>History: missed a step of the ladder</td>
</tr>
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Palpation: hyperalgesia sacral sulcus - fortin area

Active movement: restricted hip flexion and lumbar flexion.....

Provocation tests:
• thigh thrust positive
• sacral thrust ???

Yes, relevant...to be continued
Differences were only found using intensity maps. It could be concluded that patients with SIJ pain are less likely to experience pain in both in the Fortin and tuber areas.

Absence of pain in the tuber area in 90% of the responders

Van Der Wurf e.a. 2006
Thigh thrust: PPPP test

- Supine lying: hip 90° flexion, knee in flexion (slight adduction)
- Fixation sacrum
- Mobilising pressure through knee/femur
- Look for provocation (and range and end feel)
- Cave: load on medial hip
- *Mens et al. 2001* hypothesize that the PPPP test shows whether the pelvic system has been previously overloaded
Distraction

- Supine lying or crook lying
- Arms crossed, hands medial to SIAS
- Push innominates to lateral and posterior
- Test for pain/dysesthesia
Anterior compression, posterior gapping

- Side lying, ± 90° hips and knees
- Hands on anterolateral aspect of the uppermost iliac crest
- Apply an anteromedial force
- Test for pain/dysesthesia?
Sacral thrust

- Apply a postero-anterior force on the sacrum
- The presumed action is an anterior shearing force of the sacrum on both the ilia
- Test for pain/dysesthesia?
### Is L5-S1 pain producing structure?

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<td>Lumbar spine</td>
<td>History: LBP, RP S1 area, cramping dorsal thigh, moving out parents house, provocation by walking, jogging, sitting tall</td>
</tr>
<tr>
<td></td>
<td>• Discopathy</td>
<td>Palpation: hyperalgesia UPA left L5-S1 zygapophyseal joint</td>
</tr>
<tr>
<td></td>
<td>• Zygapophyseal joint restriction</td>
<td>Inspection: no antalgic shift</td>
</tr>
<tr>
<td></td>
<td>• .....</td>
<td>Active movement: restricted flexion ROM but willing to do, provocation by extension</td>
</tr>
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<td></td>
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<td>Slump -</td>
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Yes, relevant … to be continued
2. Manual therapeutic diagnosis
articular restriction SIJ

• palpation : SIPS left lower, SISA left higher (?), TI no difference

• kinematic tests :
  • standing trunk flexion : left SIPS more cranial
  • Gillet hip flexion : ipsilateral left +, contralateral left +

• Left ilium anterior rotation stiffened endfeel

• Short arm glide stiffened endfeel

Left innominate anterior rotation restriction
Standing trunk flexion:

- Feet ± 15 cm wide
- Palpate PSIS
- Patient flexes maximally
- Monitor movement of PSIS’s
- Normally both PSIS’s should move symmetrically
- Positive if one PSIS has moved more cephalad

**Left innominate restricted**
NWB - Ipsilateral Gillet

- Feet ± 15 cm wide
- Palpate PSIS (and innominate) on the non weight bearing side
- Palpate median crest (S2) with other hand
- Patient flexes hip to 90°-120°
- Monitor movement of PSIS relative to sacrum
- Compare left & right

- Negative: SIPS ↓1-2 cm relative to sacrum
- Positive: SIPS moves up or remains static relative to sacrum
WB - Contralateral Gillet

- Feet ± 15 cm wide
- Palpate PSIS (and innominate) on weight bearing side
- Palpate median crest (S2) with other hand
- Patient flexes hip to 90°-120°
- Monitor movement of PSIS relative to sacrum
- Compare left & right
- Negative: SIPS ↓1-2 cm relative to sacrum
- Positive: SIPS moves up or remains static relative to sacrum

Left innominate restricted
Intra-articular glide: short arm

- First determine treatment plane (cranial to cranial and slightly lateral)
- Apply a gentle oscillatory force in:
  - Cranial direction
  - Caudal direction
- Analyze neutral and elastic zone and compare to other side

Left innominate restricted

(Diane Lee 2004)
Innominate anterior

- Prone
- Fixation sacrum contralateral below S2 (apex)
- Mobilising hand with ulnar side (pisiforme) on
  direction: anterior, lateral and cranial

Left innominate anterior rotation restricted
2. Manual therapeutic diagnosis
   articular restriction SIJ

- palpation: SIPS left lower, SISA left higher (?), TI no difference
- kinematic tests:
  - standing trunk flexion: left SIPS more cranial
  - Gillet hip flexion: ipsilateral left +, contralateral right +
- Left ilium anterior rotation stiffened endfeel
- Short arm glide stiffened endfeel
- ROM hip prone: lateral rotation ROM left ↑, medial rotation ROM left ↓

Left innominate anterior rotation restriction
2. Manual therapeutic diagnosis
articulation restriction L5-S1 right - BST

- UP/A L5-S1 left painful
- active 3D extension left painful at left side
- Sidelying gap zygapophyseal joints
  - Left not restricted – normal endfeel
  - Right restricted – stiffer endfeel
Lumbar Spine Rotation Sidelying

Localiseren op het juiste segment!
2. Manual therapeutic diagnosis
articulation restriction Thoracic Spine

- P/A mid thoracic spine stiffened
- passive 3D-extension homonymous +
Passive non-physiological movements

- **PA**
  - Central/bilateral
  - Unilateral

- **Transverse pressure**
Passive physiological movements

- Test for
  - ROM
  - Endfeel
  - Symptom provocation
# Mechanical Dysfunction Analysis

<table>
<thead>
<tr>
<th>UnControlled Movement</th>
<th>Translational/Articular</th>
<th>Range/Myofascial</th>
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</thead>
<tbody>
<tr>
<td>restriction</td>
<td>• L5-S1 right – BST</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• Mid-Thoracic extension</td>
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</tr>
</tbody>
</table>
3. Movement control impairment diagnosis

1. Site of UCM
2. Direction of UCM
3. Threshold of UCM

- Site of pain refers to site of UCM
- Provocative direction refers to direction of UCM
Control of Direction TEST

HYPOTHESIS of UCM

1. Site of pain ~site of UCM
2. Provocative direction ~direction of UCM
3. QUALITY OF MOVEMENT—Relative stiffness/flexibility

Different Diagnosis

Structural/Medical/Social diagnosis

Manual Therapeutic Art. restriction

Site & Direction UCM

Treatment Plan

Kinetic Control
3. Movement control impairment diagnosis

- **History**: LBP left – during extension(-rotation) related activities
- **Posture**: well trained leg- and back muscles, rather hypotone abdominal wall
- **Active Movements**:
  - provocative extension (+ 3D homonymous)
  - Restricted lumbar flexion (short ES ? High ilia ?)

**hypothesis**: L5-S1 extension-rotation UCM ?
3. Movement control impairment diagnosis

Identifying movement control impairments with movement control tests: control of direction of UCM

Motor Control Testing Process

- Observe (natural movement for relative stiffness & relative flexibility)
- Teach (Visual, Auditory, Kinaesthetic)
- Test (without feedback, support or cueing)
- Rate ✓✓ or ✓× or ××
- Relate (to symptomatic movements & functional patterns)
- Rehab (Clinical Priority)
3. Movement control tests

• **Standing forward lean** : can he prevent Lx extension?

• **Knee lower abdominal test** : can he prevent Lx extension-lumboplevic rotation?

• **Standing hip extension** : can he prevent Lx extension-lumboplevic rotation?

Selection of test

• Extension and/or rotation

• Functional link : standing tests ~lifting, hiking
Standing Forward Lean:
Control lumbar extension while moving the hips

Tests for uncontrolled movement of the low back

Classify site: low back
Direction: extension
Threshold: low

Standing forward lean VX SOE and FB of hands and wall to prevent upper lumbar extension
Identifying movement control impairments with movement control tests

Excellent intra-observer reliability, substantial inter-observer reliability

(Luomajoki et al 2007)

Inter-observer reliability and clinical importance LBP-patients and healthy subjects

(Roussel et al 2007)

Significant differences between patients with and without low back pain in ability to control movements of the lumbar spine

(Luomajoki et al 2008)
Altered lumbopelvic movement control but not generalised joint hypermobility is associated with increased injury in dancers - a prospective study.

• 2 movement control tests may be useful for the identification of dancers at risk for developing musculoskeletal injuries, as they predict 78% of musculoskeletal injuries to the lower limbs.

• The results suggest that uncontrolled movement is associated with an increased risk of developing musculoskeletal injuries to the lower extremities in dancers.

Roussel et al 2010 Manual Therapy
Uncontrolled Movement
Site: Low back and pelvis; Direction: Rotation - extension; Threshold: Low

Knee Lift Abdominal Test (KLAT)

Inter-observer reliability and clinical importance of the KLAT (Roussel)

The PBU

- Knee lower abdominal test VX extra FB with hands to keep ribcage down to prevent lumbar extension and pelvis left rotation
Identifying movement control impairments with movement control tests

Standing Hip Extension:
Control lumbar extension and lumbopelvic rotation while extending the hip till -15°

Tests for uncontrolled movement of the low back

Classify site: low back
Direction: extension - rotation
Threshold: low

• standing hip extension XX extension and pelvis left rotation UCM
3. Movement control tests

• Standing forward lean VX SOE and FB of hands to prevent upper lumbar extension

• Knee lower abdominal test VX extra FB with hands to keep ribcage down to prevent lumbar extension and pelvis left rotation

• Standing hip extension XX extension and pelvis left rotation UCM

hypothesis confirmed
L5-S1 extension rotation
(pelvis faces left) UCM ?
• Standing forward lean VX SOE and FB of hands to prevent upper lumbar extension
• Knee lower abdominal test VX extra FB with hands to keep ribcage down to prevent lumbar extension and pelvis left rotation
• Standing hip extension XX extension and rotation UCM

• L5-S1 right – BST
• Left innominate anterior rotation
• Mid-Thoracic extension
### MANAGEMENT PLANING

<table>
<thead>
<tr>
<th>Uncontrolled Translation</th>
<th>Uncontrolled Range</th>
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<tr>
<td><strong>Site and Direction of UnControlled Movement</strong></td>
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<tr>
<td>• Standing forward lean VX SOE FB of hands to prevent upper lumbar extension</td>
<td>• Gluteus maximus</td>
</tr>
<tr>
<td>• Knee lower abdominal test VX extra FB with hands to keep ribcage down to prevent lumbar extension and pelvis left rotation</td>
<td>• Gluteus medius</td>
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<td>• Obliques</td>
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<table>
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<th>Myofascial Restriction</th>
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<td>• L5-S1 right – BST</td>
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<td>• Left innominate anterior rotation</td>
<td>• RF</td>
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<tr>
<td>• Mid-Thoracic extension</td>
<td>• Iliocostalis – Longissimus</td>
</tr>
<tr>
<td></td>
<td>• piriformis</td>
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Testing recruitment efficiency

- Gluteus maximus XX cocontraction rigidity, lateral hip rotation, Lx extension before inner range
- Gluteus medius posterior XX hip flexion before inner range
- Obliques XX
MANAGEMENT PLANING

**Uncontrolled Translation**

**Site and Direction of UnControlled Movement**
- Standing forward lean VX SOE and FB of hands to prevent upper lumbar extension
- Knee lower abdominal test VX extra FB with hands to keep ribcage down to prevent lumbar extension and pelvis left rotation
- Standing hip extension XX extension and rotation UCM

**Uncontrolled Range**
- Gluteus maximus XX
- Gluteus medius XX
- Obliques XX

**Articular Restriction**
- L5-S1 right – BST
- Left innominate anterior rotation
- Mid-Thoracic extension

**Myofascial Restriction**
- TFL TIT XX
- RF XX
- Iliocostalis – Longissimus ?
- Piriformis VV

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Extensibility Tensor Fascia Latae
Modified Thomas Test
RESTRICTION

Mid thoracic extension restriction

L5-S1 left zygapophyseal extension rotation UCM

Inefficient glutei

L5-S1 left zygapophyseal restriction right

BST

Ilium anterior rotation restriction left

(Mid thoracic flexion UCM)

Short/dominant
Longissimus iliocostalis

Short/dominant TFL TIT and RF

Inefficient oblique abdominals

Inefficient glutei
**Standing forward lean VX** SOE and FB of hands to prevent upper lumbar extension

**Knee lower abdominal test VX** extra FB with hands to keep ribcage down to prevent lumbar extension and pelvis left rotation

**Standing hip extension XX** extension and rotation UCM

- Gluteus maximus XX
- Gluteus medius XX
- Obliques XX

**Articular Restriction**
- L5-S1 right – BST
- Left innominate anterior rotation
- Mid-Thoracic extension

**Myofascial Restriction**

+/- neurodynamic influences
- TFL TIT XX
- RF XX
- Ilicostalis – Longissimus ?
- Piriformis VV
Lumbar Rotation Manipulation

Positioned in flexion
Left innominate anterior rotation manipulation

Prone

Fixation sacrum contralateral below S2 (apex)

Mobilising hand with ulnar side (pisiforme) on SIPS
Direction: anterior, lateral and cranial
Left innominate anterior rotation manipulation
Innominate anterior: home exercise
• **Starting position of the patient**: sitting, arms crossed with hands on the shoulders
• **Fixation**: fixation of the cranial vertebra by the therapists chest (or towel) while he/she is holding the patients elbows ("compression")
• **Mobilisation**: the therapist is moving his bodyweight from the front foot towards the rear foot (from kneeflexion towards knee extension)
Supine Thoracic Gap Manipulation
### MANAGEMENT PLAN

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### Inner range hold exercises ....10x10”
- Gluteus maximus XX
- Gluteus medius XX
- Obliques XX

### Movement reversals - 2 minutes

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Recruiting Oblique Abdominals to control extension-rotation under low load
..and lifting one leg alternating
Recruiting Obliques Abdominals

- learn to control lumbar extension and lumbopelvic rotation

- Visual: look, PBU
- Auditive: bring your lower ribs down to the ilia
- Kinaesthetic: thumb on lower ribs, fingers on ilia
  ...close this....
Retraining recruitment efficiency

- Gluteus maximus
- Gluteus medius posterior
- Obliques
Recruiting Glutei to control extension under low load

- against the wall
- lack of ROM
- poor recruitment

- hips and knee flexed
- ...10 x 10 seconds
standing postural correction

- without wall
- During ADL
- Submaximal tonic recruitment of gluts
- No cocontraction rigidity
- Breathing ! Talking !
Movement Control Exercise: standing hip extension

- with wall
- Standing hip extension
- Submaximal tonic recruitment of gluts & obliques
- No cocontraction rigidity
- Breathing! Talking!
Movement Control Exercise: standing hip extension

- without wall
- Standing hip extension
- Submaximal tonic recruitment of gluts & obliques
- No cocontraction rigidity
- Breathing! Talking!
Movement Control Exercise: lunge
Movement Control Exercise: walking
sitting postural correction
Movement Control Exercise: sit to standing
Movement Control Exercise: standing lean w/o extension UCM
Movement Control Exercise: learning to bend the lumbar spine
Movement Control Exercise: Bridge
Single Leg Extension (gluts & obliques)
Movement Control Exercise: Small Knee Bend without hip flexion and knee valgus
Home exercises

- 2 movement control exercises – 2 minutes – 2/day
- ADL postural control: standing-sitting-walking
# MANAGEMENT PLANING

## Uncontrolled Translation vs Uncontrolled Range

### Site and Direction of UnControlled Movement

- **Standing forward lean VX**: SOE and FB of hands to prevent upper lumbar extension
- **Knee lower abdominal test VX**: extra FB with hands to keep ribcage down to prevent lumbar extension and pelvis left rotation
- **Standing hip extension XX**: extension and rotation UCM

### Myofascial Restriction

- **TFL TIT XX**
- **RF XX**
- **Iliocostalis – Longissimus ?**
- **Piriformis VV**

### Articular Restriction

- **L5-S1 right – BST**
- **Left innominate anterior rotation**
- **Mid-Thoracic extension**

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Regaining extensibility

- Passive sustained stretch 2 minutes
- Active inhibitory stretch 3x30 seconds
Home exercises

- Passive sustained stretch 2 minutes
- Active inhibitory stretch 3x30 seconds
Session

1  
HISTORY

Tissue & Manual Therapeutic Diagnosis

MT Rehab

2  
Tissue & Manual Therapeutic Diagnosis

Movement Control Impairment Diagnosis + 1 exercise

MT Rehab
Session

1. HISTORY
2. Tissue & Manual Therapeutic Diagnosis
3. Movement Control Impairment Diagnosis + 1 exercise

Movement Control exercises

MOVEMENT BREAK DOWN

Extensibility stretches (active – passive)
HISTORY

Tissue & Manual Therapeutic Diagnosis

Movement Control Impairment Diagnosis + 1 exercise

MT Rehab

Extensibility stretches (active – passive)
Evolution

• Always combination of MT and Movement control Lumbar rotation-extension
  • Session 1-3 : espec MT SIJ
  • Session 4 : more L5-S1 techniques and obliques-glutes ....
• Continued to walk & run - Distance increased gradually
• fluctuating evolution, often ventral thigh pain after hiking
• Session 7 : better 😊
24/12
31/12: pain ventral thigh one day after running, no provocation during running
5/1: run w/o Sx, left buttock less sensitive, no groin pain anymore
12/1: started to work again, some more pain during night (turn around), buttock pain sitting in train
20/1: hiking 30 km, sensitive in low back left + RP left ventral thigh, supine is provocative
30/1: in the morning pain left SIJ with RP dorsal leg, once walking Sx improve, turning around provocative
9/2: better! Walked 25 km, also 36 km yesterday w/o Sx
23/2: no Sx last week, also no after 50 km walking
9/3: no Sx anymore despite hiking