

“HOMOGENIZATION OF GRADES OF MOVEMENT IN OMT EDUCATIONAL SETTING:

RELIABILITY STUDY FOR THE DETECTION OF THE START OF THE TRANSITION ZONE AND FIRST STOP DURING CAUDAL TRACTION OF COXOFEMORAL JOINT IN HEALTHY SUBJECTS AND PATIENTS WITH OSTEOARTHRITIS”

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IFOMPT Teachers Meeting, Hoge School Utrecht, The Netherlands



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INTRODUCTION

Diagram for grades of movement



The diagram of grades of movement in manual therapy is built according to the tissue resistance.

Use in practice*:

- The **exact therapeutic dosage**
- The **registration** during assessment, treatment and reassessment
- The **communication** and **teaching** between professionals**

Difficulties in educational background:

- lack of **standardization** and **reliability/validity studies**



*Pfund R., Zahnd F. Differentiation, examination and treatment of movement disorders in manual therapy. 2006. Elsevier
**Hengeveld E., Banks K. Maitland. Manipulación periférica. 4ª edición. 2007. Elsevier

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INTRODUCTION

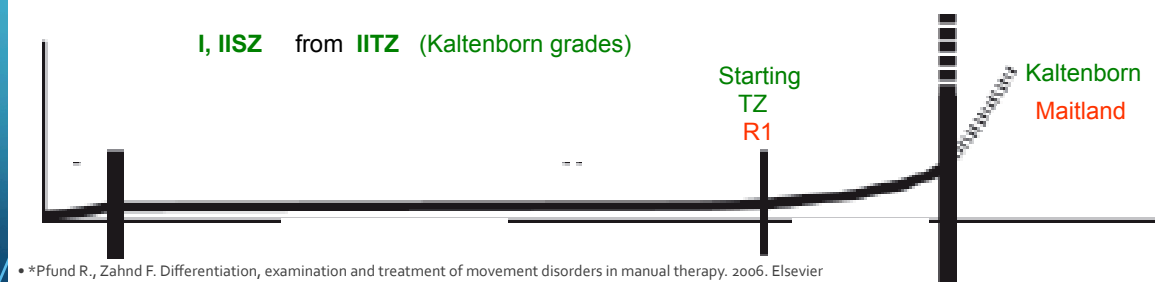
Diagram for grades of movement

The **standardization** of grading movement methods should be carried out according to the felt tissue resistance *.

R1 or **starting TZ** = first felt resistance

separates **I, II** from **III, IV** (Maitland grades)

I, IISZ from **IITZ** (Kaltenborn grades)



*Pfund R., Zahnd F. Differentiation, examination and treatment of movement disorders in manual therapy. 2006. Elsevier



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INTRODUCTION: STANDARDIZATION

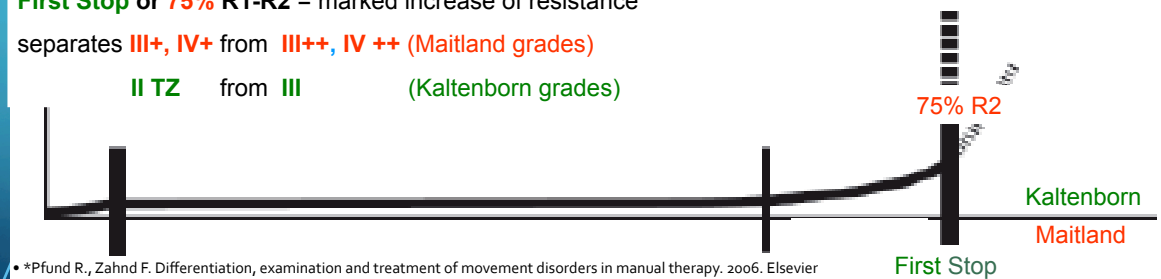
Diagram for grades of movement

The **standardization** of grading movement methods should be carried out according to the felt tissue resistance *.

First Stop or **75% R1-R2** = marked increase of resistance

separates **III+, IV+** from **III++, IV ++** (Maitland grades)

II TZ from **III** (Kaltenborn grades)



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INTRODUCTION

DOSAGE: uses of graded movement in evaluation and treatment

Evaluation

- Function tests
- Trial Treatment



Treatment

- Pain modulation
- Relax muscles
- Maintain/increase mobility



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Kaltenborn J.M. *Practitioner Manual: Extremities*, 2004 McGraw-Hill Interamericana

INTRODUCTION: RELIABILITY AND VALIDITY STUDIES

grades of movement

It has not been found any study of intra or intertester reliability for the translatory movement of coxofemoral traction

Generally, the therapists have shown a **poor intra and intertester reliability** in judging resistance on a-p mobilization on lumbar spine (*Matyas & Bach 1985; Viner et al. 1991; Binkley et al. 1995; Maher & Adams 1994; Lindsay et al. 1995; Phillips & Twomey 1996*)** and on glidings on the hip joint (*Browder et al., 2004*)

There is an urgent need of reliability and validity studies
on grading methodology used in manual therapy techniques



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INTRODUCTION

Translatory joint play

Coxofemoral caudal traction



Kaltenborn F.M. Fisioterapia Manual: Manipulación- tracción de las extremidades y la columna. 2009. OMT España

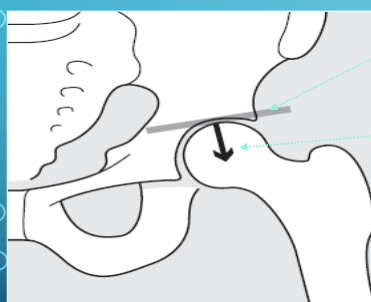
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INTRODUCTION

Translatory joint play

Coxofemoral caudal / distal traction



Plane of treatment:
Concave surface acetabulum

Caudal traction direction:
Longitudinal axis of femur

Test: Actual Resting Position

Quantity – Quality (End-Feel) divide traction in **grades:**
First resistance and First Stop



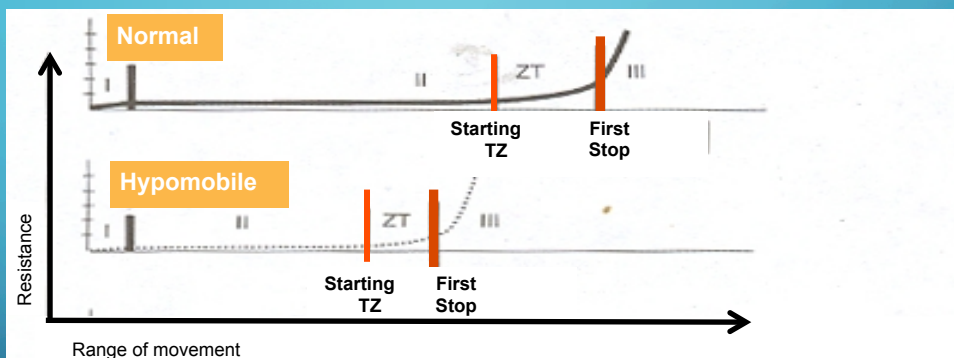
Kaltenborn F.M. Fisioterapia Manual:
Manipulación- tracción de las extremidades
y la columna. 2009. OMT España

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INTRODUCTION: VALIDITY STUDY

Diagram of movement: caudal traction joint play



Hip osteoarthritis: clinical evidence suggests that amount of joint separation is reduced and resistance increase faster and more intense.



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OBJECTIVES

To test the **validity** and the intra and intertester **reliability** on detection of **first increase of resistance** and **first stop** during coxofemoral traction in healthy subjects and in subjects with a diagnosis of hip osteoarthritis (grade IV Kellgren-Lawrence), from measurements of force applied on a dynamometer and the distance of joint surface separation measured by ultrasonography.



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MATERIAL AND METHODS: SAMPLE AND EXAMINER CHARACTERISTICS

Sample and examiner characteristics

27 subjects: 18 tested hips in healthy group and 18 in hip osteoarthritis group

Common inclusion criteria for both groups :

- Subjects older than 50 years (Juhakoski et al., 2008; Liikavainio et al., 2008).
- Informed consent.

for hip osteoarthritis cases :

- Diagnosis of hip osteoarthritis (grade IV Kellgren-Lawrence scale) without symptoms in lumbar, pelvis or knee regions.

for healthy cases:

- Healthy and asymptomatic subjects in hip, lumbar, pelvis and knee regions

Common exclusion criteria for both groups :

- Contraindication for manual therapy joint techniques use as: presence of a contraindicated end-feel during testing of passive joint movement range (Placzek, 2000)

for hip osteoarthritis cases : provocation during coxofemoral caudal traction.

for healthy cases : provocation during evaluation (Placzek, 2000).



2 PT's with specialization in OMT, with 10 years of experience and consensus training

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MATERIAL AND METHODS

Procedure

1. Subject in supine with pelvic stabilization in actual resting position of coxofemoral joint.
2. Randomly, both evaluators had to detect twice the beginning of TZ and first stop during caudal coxofemoral traction with the following steps:
 - Balancing of dynamometer joined to the traction system
 - Ultrasonography device visualizes coxofemoral joint
 - Evaluator tractions through dorsal movement of his body
 - Evaluator stops at 1) Beginning of TZ or R1 and 2) First Stop
 - Dynamometer and ultrasonography data are registered in these two points
3. Both evaluators repeated the procedure twice.
4. Extraction-treatment of ultrasonography images.



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RESULTS

Reliability study

Reliability

Excellent

Moderate to

Good

(Shrout-Fleiss)



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HEALTHY	Force (dynamometer)	Joint separation (ultrasonography)
Starting TZ or R1	Intratester tester 1: ICC = 0.84 (p<0,001). tester 2: ICC = 0.88 (p<0,001). Intertester: ICC = 0.63 (p=0,002)	Intratester tester 1: ICC = 0.76 (p=0,002). tester 2: ICC = 0.86 (p<0,001). Intertester: ICC = 0,07 (p=0,43).
First Stop	Intratester tester 1: ICC = 0.86 (p<0,001). tester 2: ICC = 0.88 (p<0,001). Intertester: ICC = 0.51 (p=0,019).	Intratester tester 1: ICC = 0.65 (p=0,017). tester 2: ICC = 0.54 (p=0,06). Intertester: ICC = 0.75 (p=0,004).
HIP OSTEO ARTHRITIS	Force	Joint separation
Starting TZ or R1	Intratester tester 1: ICC = 0.96 (p<0,001). tester 2: ICC = 0.74 (p=0,004). Intertester: ICC = 0.29 (p=0,15)	Intratester tester 1: ICC = 0.91 (p<0,001). tester 2: ICC = 0.51 (p=0,08). Intertester: ICC = 0.55 (p=0,01).
First Stop	Intratester tester 1: ICC = 0.96 (p<0,001). tester 2: ICC = 0.89 (p<0,001). Intertester: ICC = 0.51 (p=0,017).	Intratester tester 1: ICC = 0.78 (p=0,002). tester 2: ICC = 0.65 (p=0,01). Intertester: ICC = 0.65 (p=0,001).

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DISCUSSION: RELIABILITY

The points used to determine grades of movement, especially the First Stop, seem to be more objective points of measurement than ranges of graded movement.

According to Pfund and Zahnd, these points allow for integration of Kaltenborn and Maitland grading of movement.



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DISCUSSION: RELIABILITY AND STANDARDIZATION

Although our students can integrate both gradings in relation to tissue resistance:

Both gradings refer to different type of mobilization:

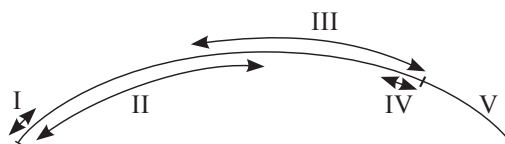
- Maitland: rotatoric amplitudes in places within ROM according to different resistances.
- Kaltenborn: translatoric range of motion before and after a barrier called «First Stop».

Although standardization according to resistance is possible, student should be aware of the rich legacy of the different therapeutic techniques of our profession.

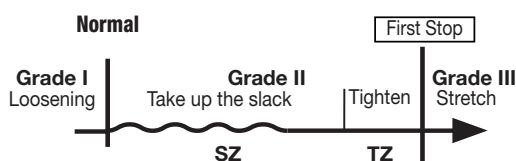


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Maitland/Ganne curved grades



Kaltenborn translatoric grades



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DISCUSSION RELIABILITY STUDY

Graded traction movement Coxofemoral reliability study

- Results of intratester reliability similar to the results of goniometric measurement in rotatoric tests (Cleland J., 2006)
- Graded movements will follow as a subjective phenomenon in essence (Hengeveld E., 2007).
- Variability on intertester reliability could be also due to anthropometric differences (angle of traction system).

CONCLUSION RELIABILITY STUDY

Although not possible to generalize, more objective resistance points (especially first stop) would be more useful to teach therapeutic dosage based on graded movements



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RESULTS: VALIDITY STUDY

Descriptive and Comparative studies

HEALTHY	Average force	Average joint separation
Beginning TZ or R1	1,95 kg. (S.D.= 0,53).	0,22 cm (S.D.= 0,13)
First Stop	4,43 kg. (S.D.= 0,95).	0,24 cm (S.D.= 0,14)
HIP OSTEO ARTHRITIS	Average force	Average distance
Beginning TZ or R1	2,78 kg. (S.D.= 0,94).	0,032 cm (S.D.= 0,05)
First Stop	5,94 kg. (S.D.= 1,31).	0,14 cm (S.D.= 0,10)

Reaching beginning of TZ (R1) and the First Stop, the necessary force is significantly increased ($p < 0,001$) and joint separation is significantly reduced ($p < 0,001$) in hip osteoarthritis group compared to healthy group



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CONCLUSION: VALIDITY STUDY

Clinical evidence and hypothesis (reduction of joint separation and increase of tissue resistance) in joint hypomobility diagnosis in this group of hip osteoarthritis patients using graded movements is quantitatively shown.

Specific grades of movement during caudal traction are a **valid tool** in detecting joint hypomobility in hip osteoarthritis patients (grade 4 in Kellgren-Lawrence scale) compared to healthy subjects



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