Demystifying Hip-Lumbo-Pelvic alignment and basic correction: Is there an ACL connection?

Andrew T. Doyle, PhD, LAT, AT, CSCS, Astym-Cert
Adjunct Professor
University of Indianapolis / Trine University

Conflict of Interest

- The views expressed in these slides and the today’s discussion are mine and based on my interpretation of the evidence and my clinical practice experience
- My views may not be the same as the views of my company’s clients or my colleagues
- Participants must use discretion when using the information contained in this presentation

Learning Outcomes:

- Recognize the prevalence of ACL injury among athletes
- Recognize the economic burden an ACL injury can cause
- Identify the relationship between hip flexion and anterior tilt on glute muscle angle of pull on the femur
- Identify the relationship between hip-lumbo-pelvic asymmetries and lower extremity injury

Learning Outcomes:

- Define Regional Interdependence
- Recognize the difference between mobilizations with movement and muscle energy techniques to correct hip-lumbo-pelvic asymmetries
- Identify bony landmarks of the hip-lumbo-pelivic area upon palpation
- Identify hip-lumbo-pelvic alignment asymmetries using clinical observation
- Apply a manual correction based on common observed hip-lumbo-pelvic asymmetries

Course Flow

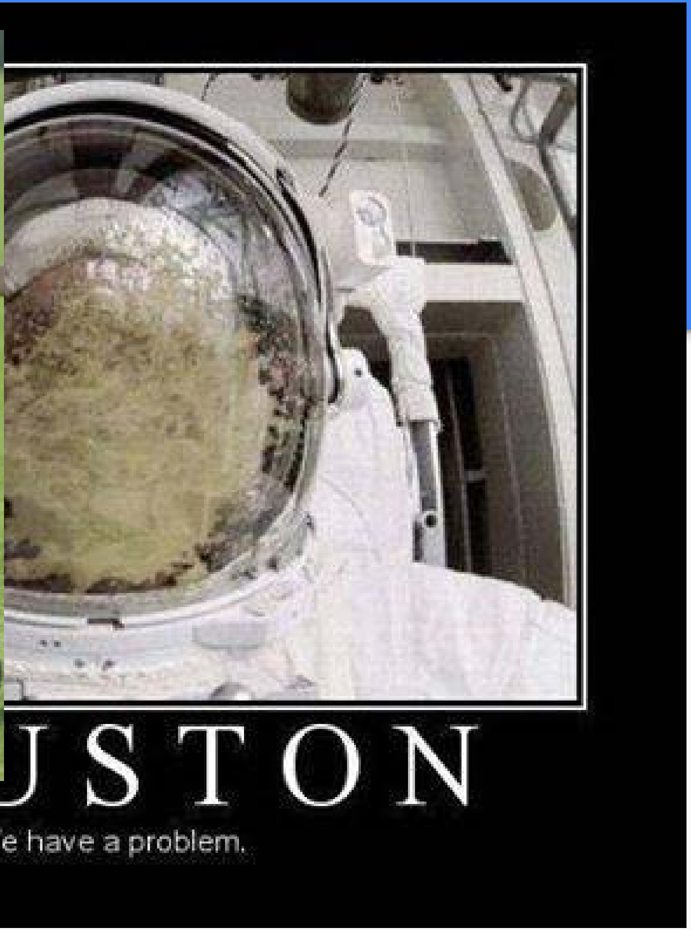
- EBP regarding hip-lumbo-pelvic alignment and it’s ***possible*** influence on ACL injury among females
- Brief Anatomy and terminology Review
- Evaluation Process
- Corrections Demonstrated
- Lab Time
- Wrap Up

Disclosure

- Trained and Certified in ‘The Basics of Sacroiliac Mobilization’ from Great Lake Seminars- a course created by Patrick Hoban, PT, MS, OCS, ATC, FF-CIMT
- Trained and Certified in Mulligan™ Concept Manual Therapy for the UPPER Extremity
- Some of the techniques demonstrated will utilize joint mobilization with movement for the lower extremity. I have spent 5 years integrating Mulligan™ Concepts into treatment for patients with hip corrections.

Disclosure (con’t)

- This course is not intended to certify or teach nuances of the Mulligan™ Concept Manual Therapy technique or the ‘The Basics of Sacroiliac Mobilization’ from Great Lake Seminars
- Presenter has no financial relationship with Mulligan Concept™ or Great Lakes Seminars
- Do not participate as a model if you have a known hip-lumbo-pelvic dysfunction where ME or MWM would further aggravate your condition



https://jokideo.com/houston-we-have-a-problem-2/

TABLE 1

Rate of Anterior Cruciate Ligament Ruptures by Sport[a]

Sport	All Rupture	Primary Rupture	Recurrent Rupture
Basketball			
Men's			
Women's			
Gymnastics (wome			
Ice hockey			
Men's			
Women's			
Field hockey (wom			
Football (men's)			
Lacrosse			
Men's			
Women's			
Soccer			
Men's			
Women's			
Volleyball (women			

[a]Data are sho
exposures (95% CI

TABLE 2

Rate Ratio of Anterior Cruciate Ligament Ruptures in Women Versus Men

	Primary Rupture		Recurrent Rupture	
Sport	Rate Ratio (95% CI)	P Value	Rate Ratio (95% CI)	P Value
Basketball	2.6 (1.9-3.4)	<.0001[a]	1.9 (0.8-4.3)	.12
Ice hockey	0.6 (0.2-1.7)	.33	0.0 (0.0-8.6)	.57
Lacrosse	1.0 (0.7-1.5)	.99	1.4 (0.3-5.8)	.66
Soccer	2.1 (1.3-3.4)	.0016[a]	3.8 (1.3-15)	.02[a]

[a]Achieved statistical significance.

Gans, 2018

Table 1. Anterior Cruciate Ligament (ACL) Injury Rates per 100 000 Athlete-Exposures, High School Sports-Related Injury Surveillance Study, United States, 2007/2008–2011/2012[a]

	ACL Injuries			AEs			Rate per 100 000 AEs			
	Competition	Practice	Total	Competition	Practice	Total	Competition	Practice	Total	Rate Ratio (95% CI)[b]
Sport										
Football	198	88	286	423 874	2 156 763	2 580 637	46.7	4.1	11.1	**11.5 (8.91, 14.72)**
Boys' soccer	35	9	44	271 345	643 206	914 551	12.9	1.4	4.8	**9.2 (4.43, 19.18)**
Girls' soccer	83	13	96	235 938	550 355	786 293	35.2	2.4	12.2	**14.9 (8.30, 26.72)**
Volleyball	15	5	20	284 625	556 983	841 608	5.3	0.9	2.4	**5.9 (2.13, 16.15)**
Boys' basketball	18	7	25	328 264	777 796	1 106 060	5.5	0.9	2.3	**6.1 (2.55, 14.59)**
Girls' basketball	71	21	92	267 297	627 094	894 391	26.6	3.3	10.3	**7.9 (4.88, 12.91)**
Wrestling	14	13	27	215 378	594 052	809 430	6.5	2.2	3.3	**3.0 (1.40, 6.32)**
Baseball[c]	3	3	6	304 200	557 764	861 964	1.0	0.5	0.7	1.8 (0.37, 9.08)
Softball	13	8	21	226 111	431 135	657 246	5.7	1.9	3.2	**3.1 (1.28, 7.48)**
Sex Comparable[d]										
Boys	**56**	**19**	**75**	**903 809**	**1 978 766**	**2 882 575**	**6.2**	**1.0**	**2.6**	**6.5 (3.84, 10.86)**
Girls	**167**	**42**	**209**	**729 346**	**1 608 584**	**2 337 930**	**22.9**	**2.6**	**8.9**	**8.8 (6.25, 12.30)**
Total	**450**	**167**	**617**	**2 557 032**	**6 895 148**	**9 452 180**	**17.6**	**2.4**	**6.5**	**7.3 (6.08, 8.68)**
Boys	**268**	**120**	**388**	**1 543 061**	**4 729 581**	**6 272 642**	**17.4**	**2.5**	**6.2**	**6.9 (5.52, 8.50)**
Girls	**182**	**47**	**229**	**1 013 971**	**2 165 567**	**3 179 538**	**17.9**	**2.2**	**7.2**	**8.3 (6.00, 11.40)**

Abbreviations: AE, athlete-exposure; CI, confidence interval. Bold represents significant rate ratios.

[a] Table 1 represents unweighted data in order to calculate rates. All other tables and figures represent nationally representative weighted data.

[b] Calculated with practice as referent group.

[c] Caution should be used when interpreting results for sports with fewer than 10 total injuries such as baseball.

[d] Sex comparable sports included soccer, basketball, and baseball or softball.

Joseph, 2013

The Epidemiology of the Epidemic

So, what happens to those who have undergone ACLR in the past 24 months?

The Epidemiology o

1. Males vs. Females & Re-tear

2. Males vs. Females & Contralateral re-tear

3. NON-CONTACT vs. Contact

4. Control group males…

(Paterno, 2014)

Published in final edited form as:
Am J Sports Med. 2014 July ; 42(7): 1567–1573. doi:10.1177/0363546514530088.

Incidence of Second ACL Injuries 2 Years After Primary ACL Reconstruction and Return to Sport

Mark V. Paterno, PT, PhD, SCS, ATC[*,†,‡,§,||], **Mitchell J. Rauh, PT, PhD, MPH, FACSM**[¶], **Laura C. Schmitt, PT, PhD**[†,‡,#], **Kevin R. Ford, PhD, FACSM**[**], and **Timothy E. Hewett, PhD, FACSM**[†,‡,||,††,‡‡]
Investigation performed at the Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, USA

Abstract

Background—The incidence of second anterior cruciate ligament (ACL) injuries in the first 12 months after ACL reconstruction (ACLR) and return to sport (RTS) in a young, active population has been reported to be 15 times greater than that in a previously uninjured cohort. There are no reported estimates of whether this high relative rate of injury continues beyond the first year after RTS and ACLR.

Hypothesis—The incidence rate of a subsequent ACL injury in the 2 years after ACLR and RTS would be less than the incidence rate reported within the first 12 months after RTS but greater than the ACL injury incidence rate in an uninjured cohort of young athletes.

Study Design—Cohort study; Level of evidence, 2.

Methods—Seventy-eight patients (mean age, 17.1 ± 3.1 years) who underwent ACLR and were ready to return to a pivoting/ cutting sport and 47 controls (mean age, 17.2 ± 2.6 years) who also participated in pivoting/cutting sports were prospectively enrolled. Each participant was followed for injury and athlete exposure (AE) data for a 24-month period after RTS. Twenty-three ACLR and 4 control participants suffered an ACL injury during this time. Incidence rate ratios (IRRs)

...e Epidemic


After revision anterior cruciate ligament reconstruction, who returns to sport? A systematic review and meta-analysis

Alberto Grassi,[1] Stefano Zaffagnini,[1] Giulio Maria Marcheggiani Muccioli,[1] Maria Pia Neri,[1] Stefano Della Villa,[2] Maurilio Marcacci[1]

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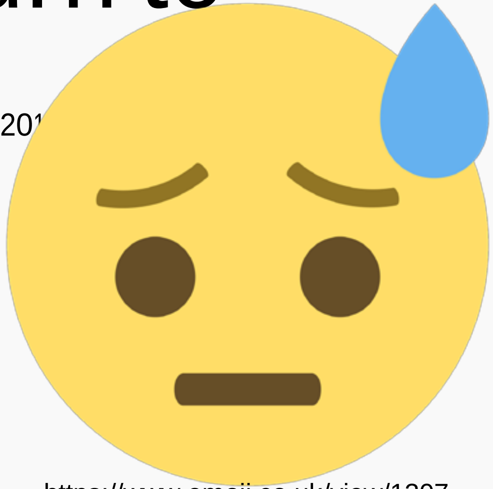
Accepted 18 May 2015
Published Online First
10 June 2015

Conclusions In spite of almost 8 patients out of 10 returning to sport after revision ACL reconstruction and showing good stability, only half of the patients returned to the same pre-injury sport level.

In a recent SR, only 50% return to previous sport level... (Grassi, 201



Grassi, 2015

https://www.emoji.co.uk/view/1307/

The other problem...

https://amino.com/blog/acl-surgery-cost/

Economic burden

What could be so costly after 6 years??

Avg. Cost of Rehabilitation alone =

Avg. Cost of ACLR Sx =

(Mather, 2013)

Societal and Economic Impact of Anterior Cruciate Ligament Tears

Richard C. Mather III, MD, Lane Koenig, PhD, Mininder S. Kocher, MD, MPH, Timothy M. Dall, MS, Paul Gallo, BS, Daniel J. Scott, MA, Bernard R. Bach Jr, MD, the MOON Knee Group, and Kurt P. Spindler, MD

Investigation performed at KNG Health Consulting, Rockville, Maryland

Background: An anterior cruciate ligament (ACL) tear is a common knee injury, particularly among young and active individuals. Little is known, however, about the societal impacts of ACL tears, which could be large given the typical patient age and increased lifetime risk of knee osteoarthritis. This study evaluates the cost-effectiveness of ACL reconstruction compared with structured rehabilitation only.

Methods: A cost-utility analysis of ACL reconstruction compared with structured rehabilitation only was conducted with use of a Markov decision model over two time horizons: the short to intermediate term (six years), on the basis of Level-I evidence derived from the KANON Study and the Multicenter Orthopaedic Outcomes Network (MOON) database; and the lifetime, on the basis of a comprehensive literature review. Utilities were assessed with use of the SF-6D. Costs (in 2012 U.S. dollars) were estimated from the societal perspective and included the effects of the ACL tear on work status, earnings, and disability. Effectiveness was expressed as quality-adjusted life years (QALYs) gained.

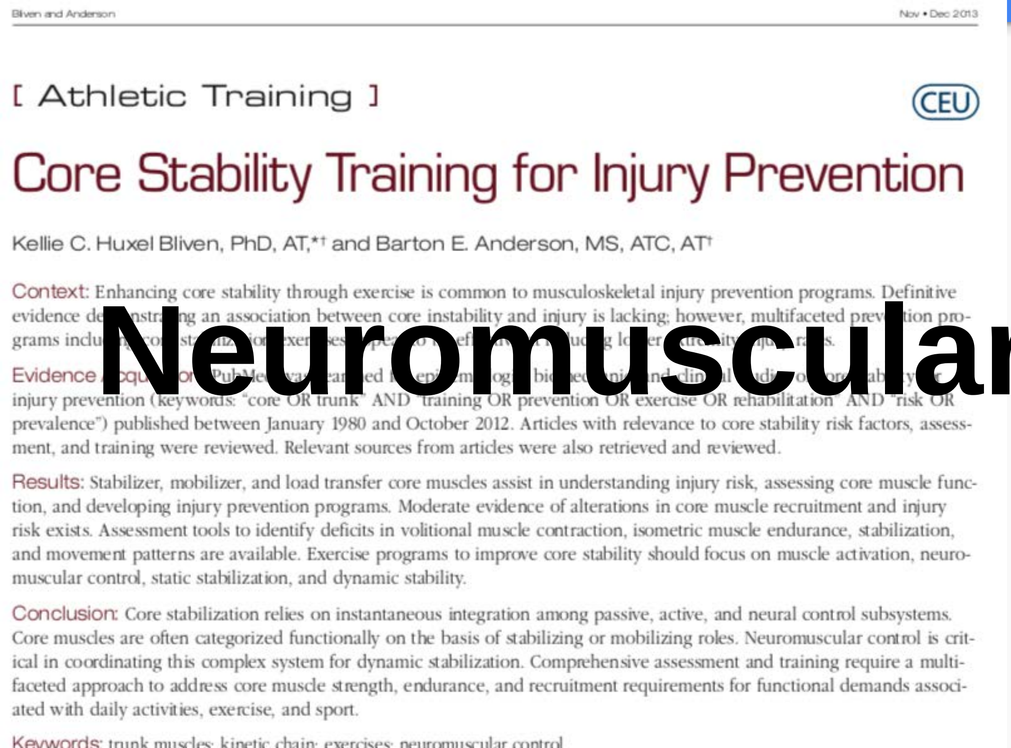
Results: In the short to intermediate term, ACL reconstruction was both less costly (a cost reduction of $4503) and more effective (a QALY gain of 0.18) compared with rehabilitation. In the long term, the mean lifetime cost to society for a typical patient undergoing ACL reconstruction was $38,121 compared with $88,538 for rehabilitation. ACL reconstruction resulted in a mean incremental cost savings of $50,417 while providing an incremental QALY gain of 0.72 compared with rehabilitation. Effectiveness gains were driven by the higher probability of an unstable knee and associated lower utility in the rehabilitation group. Results were most sensitive to the rate of knee instability after initial rehabilitation.

Conclusions: ACL reconstruction is the preferred cost-effective treatment strategy for ACL tears and yields reduced societal costs relative to rehabilitation once indirect cost factors, such as work status and earnings, are considered. The cost of an ACL tear over the lifetime of a patient is substantial, and resources should be directed to developing innovations for injury prevention and for altering the natural history of an ACL injury.

https://www.gponline.com/osteoarthritis-clinical-review/rheumatology/osteoarthritis/article/1176359

https://1hx5ll3ickiy2waa471l3o2x-wpengine.netdna-ssl.com/wp-content/uploads/2015/04/stack-of-money.jpg

So what can we do to prevent ACL injury??



Bliven and Anderson Nov • Dec 2013

[Athletic Training] CEU

Core Stability Training for Injury Prevention

Kellie C. Huxel Bliven, PhD, AT,*† and Barton E. Anderson, MS, ATC, AT†

Context: Enhancing core stability through exercise is common to musculoskeletal injury prevention programs. Definitive evidence demonstrating an association between core instability and injury is lacking; however, multifaceted prevention programs including core stabilization exercises appear to be effective at reducing lower extremity injury rates.

Evidence Acquisition: PubMed was searched for epidemiologic, biomechanic, and clinical studies of core stability for injury prevention (keywords: "core OR trunk" AND "training OR prevention OR exercise OR rehabilitation" AND "risk OR prevalence") published between January 1980 and October 2012. Articles with relevance to core stability risk factors, assessment, and training were reviewed. Relevant sources from articles were also retrieved and reviewed.

Results: Stabilizer, mobilizer, and load transfer core muscles assist in understanding injury risk, assessing core muscle function, and developing injury prevention programs. Moderate evidence of alterations in core muscle recruitment and injury risk exists. Assessment tools to identify deficits in volitional muscle contraction, isometric muscle endurance, stabilization, and movement patterns are available. Exercise programs to improve core stability should focus on muscle activation, neuromuscular control, static stabilization, and dynamic stability.

Conclusion: Core stabilization relies on instantaneous integration among passive, active, and neural control subsystems. Core muscles are often categorized functionally on the basis of stabilizing or mobilizing roles. Neuromuscular control is critical in coordinating this complex system for dynamic stabilization. Comprehensive assessment and training require a multifaceted approach to address core muscle strength, endurance, and recruitment requirements for functional demands associated with daily activities, exercise, and sport.

Keywords: trunk muscles; kinetic chain; exercises; neuromuscular control

Core Stability…

Neuromuscular Control!

(Bliven, 2013)

So what can we do??

Deficits in Neuromuscular Control of the Trunk Predict Knee Injury Risk

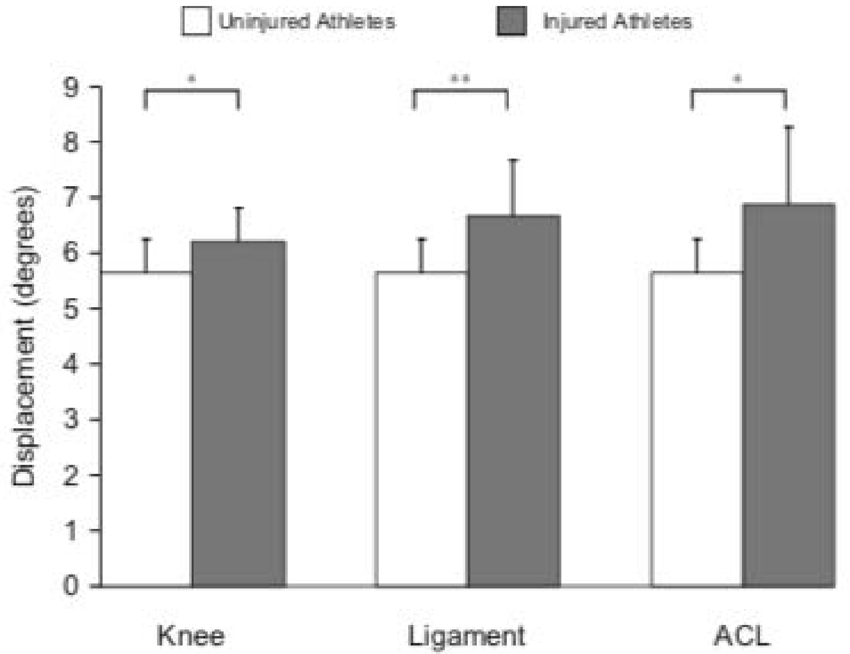


Figure 2. Displacement at 150 milliseconds in athletes (female and male combined) who subsequently sustained or did not sustain knee, ligament, or anterior cruciate ligament (ACL) injury. *$P \le .05$, **$P \le .01$. Error bars designate standard error of the mean.

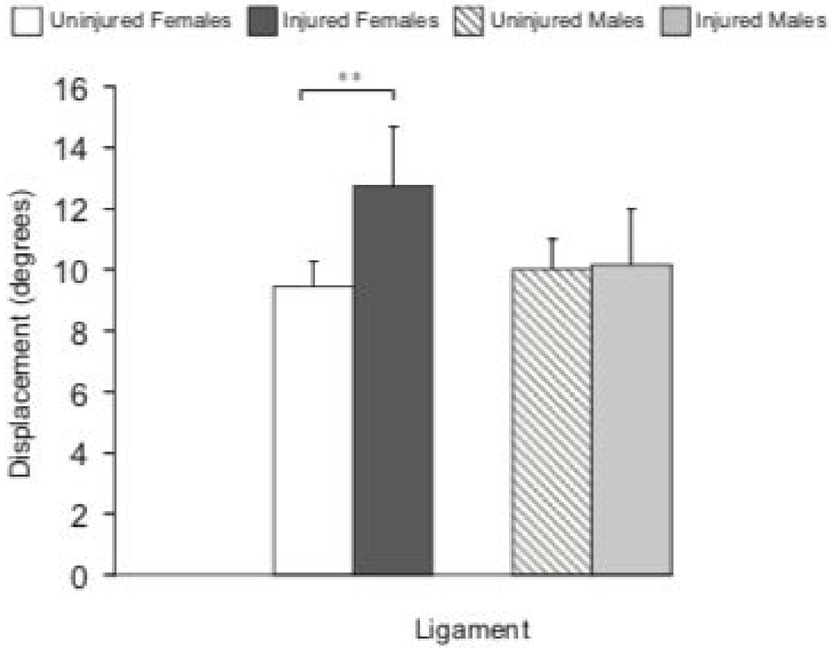


Figure 4. Maximum displacement in female and male athletes who subsequently sustained or did not sustain ligament injury. **$P \le .01$. Error bars designate standard error of the mean.

TABLE 2

Zazulak, 2007

TABLE 3

Binary Logistic Regression Analysis of the 3 Displacements on Knee, Ligament, and ACL Injury Risk in All Athletes and by Gender[a]

	All Injured Athletes			Injured Female Athletes			Injured Male Athletes		
Variable	Knee	Lig	ACL	Knee	Lig	ACL	Knee	Lig	ACL
Lateral displacement	.001[b]	.009[b]	.014[b]	.024[b]	.024[b]	.09	.016[b]	.152	.058
Overall P	.001[b]	.011[b]	.020[b]	.027[b]	.030[b]	.117	.013[b]	.156	.540
OR	1.91[b]	1.99[b]	2.24[b]	1.89[b]	2.28[b]	1.96	1.91[b]	1.71	3.24
Concordance (%)	70.7[b]	73.0[b]	78.8[b]	73.5[b]	85.8[b]	83.2	67.7[b]	62.7	76.4
Extension displacement	.506	.794	.354	.379	.384	.127	.773	.807	.682
Overall P	.501	.793	.335	.360	.406	.108	.774	.808	.684
OR	1.05	1.03	1.16	1.14	1.19	1.47	1.03	0.97	0.91
Concordance (%)	48.7	42.9	52.3	50.5	48.1	58.1	46.9	46.6	55.4
Flexion displacement	.056	.042	.045	.209	.098	.172	.146	.234	.138
Overall P	.061	.051	.061	.222	.080	.200	.139	.217	.165
OR	1.17	1.26	1.33	1.19	1.37	1.32	1.17	1.20	1.38
Concordance (%)	59.5	65.5	67.9	63.8	80.3	78.4	57.0	54.3	52.9

[a]ACL, anterior cruciate ligament; Lig, ligament; OR, odds ratio.
[b]Significant predictors.

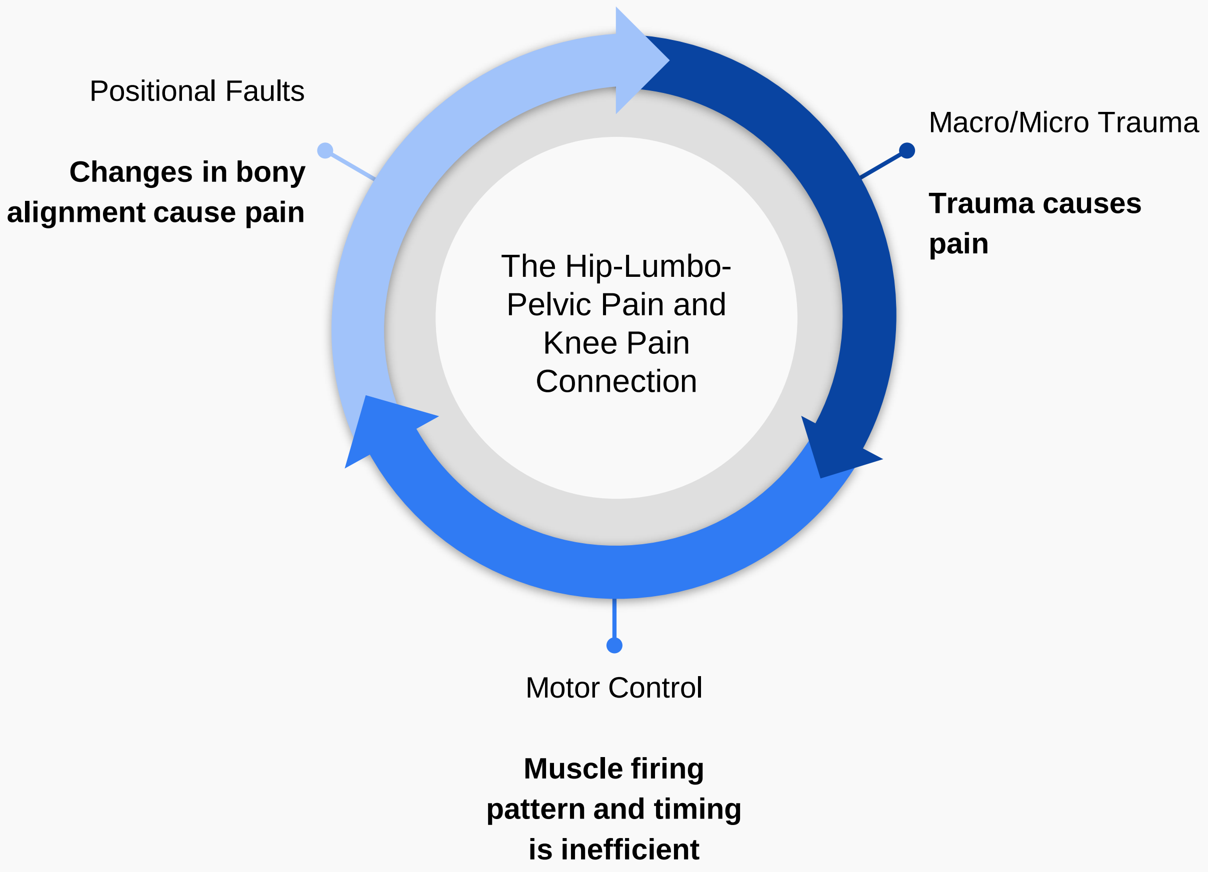
Zazulak, 2007

P Va

Variable	OR	*P*	OR	*P*	OR	*P*	OR	*P*	OR	*P*	ACL OR	ACL *P*
Lateral displacement												.126
Extension displacement												.599
Flexion displacement												.322
APR												
History of LBP	6.19[b]	.024[b]		.116				.290	9.94[b]	.015[b]		
Overall *P*	< .0001[b]		.005[b]		.012[b]		.063		.046[b]		.18	
Concordance (%)	84.5[b]		90.6[b]		89.2[b]		74.3		83.1[b]		70.2	

[a]ACL, anterior cruciate ligament; APR, active proprioceptive repositioning error of the trunk; LBP, low back pain.
[b]Significant predictors.

Zazulak, 2007


Positional Faults
Changes in bony alignment cause pain
Macro/Micro Trauma
Trauma causes pain
The Hip-Lumbo-Pelvic Pain and Knee Pain Connection
Motor Control
Muscle firing pattern and timing is inefficient

Positional Faults

Changes in bony alignment cause pain

Motor

Musc
pattern
is ine

http://blog.asherauto.com/signs-you-might-have-wheel-alignment-problems/

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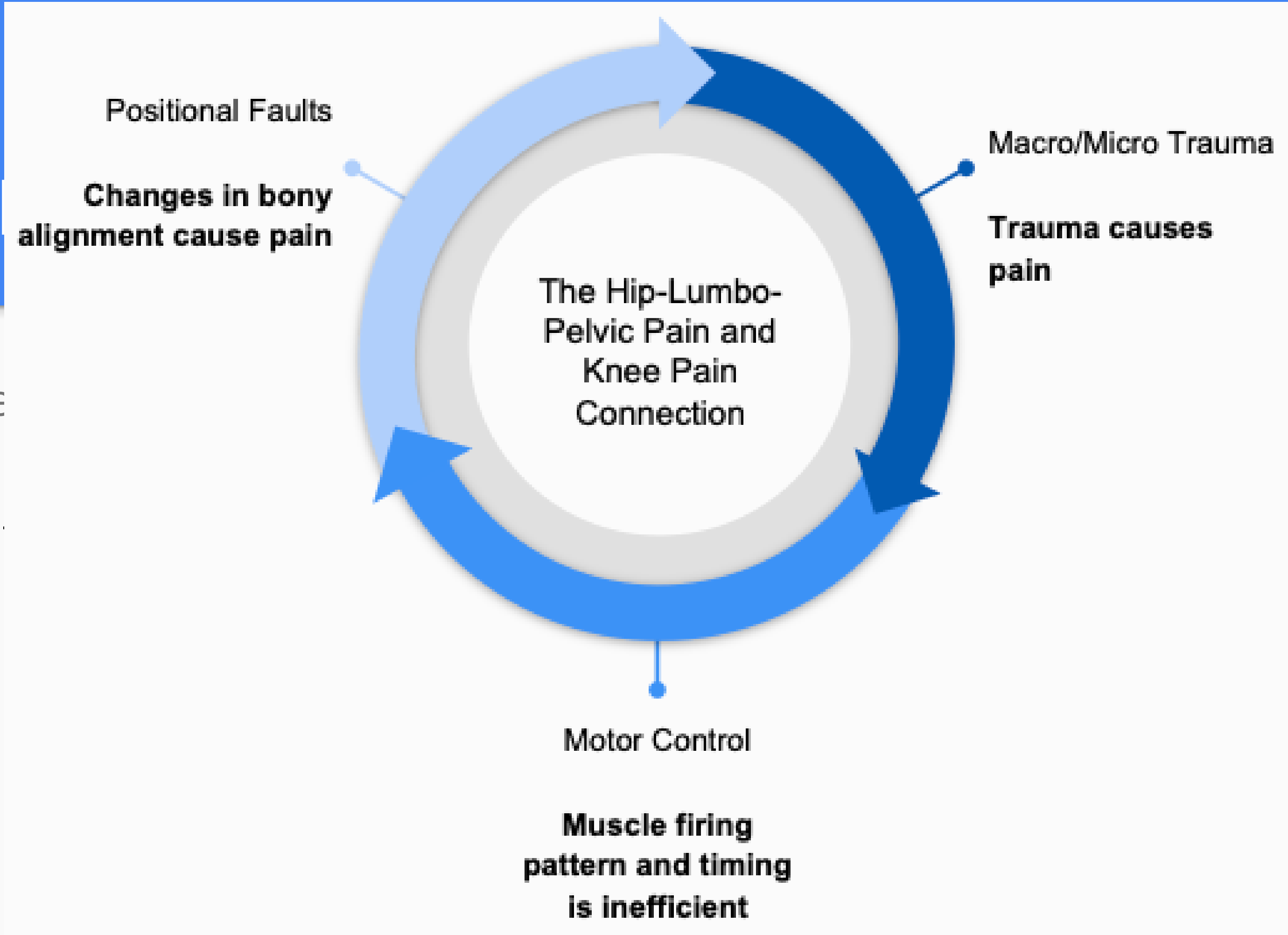

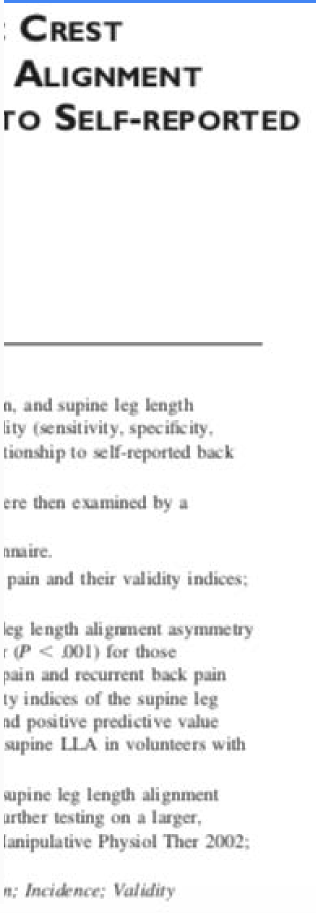
CREST
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TO SELF-REPORTED

n, and supine leg length
lity (sensitivity, specificity,
tionship to self-reported back
ere then examined by a
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pain and their validity indices;
leg length alignment asymmetry
r ($P < .001$) for those
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Fig. 1. Cobb's angle (A: 68°) and sacral horizontal angle (B: 45°) of the patier initial assessment.

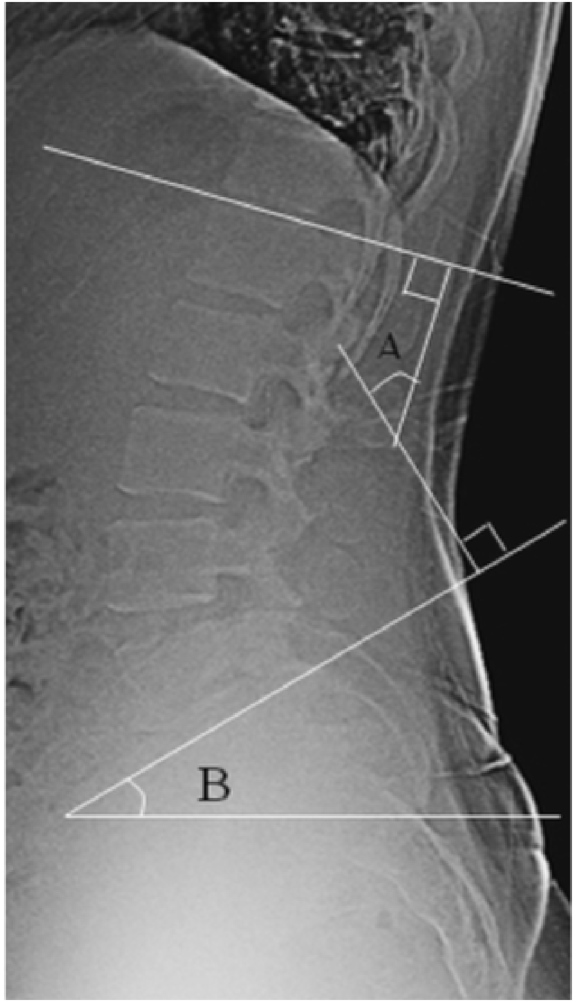

Fig. 7. Cobb's angle (A: 47°) and sacral horizontal angle (B: 31°) of the patient at the final assessment.

tsp

ment of chronic low back
acral horizontal angle

te School, Inje University, Republic of Korea
hae, Gyeongsangnam-do, 621-749, Republic of Korea

used by physical therapists and athletic trainers in
ous musculoskeletal and neuromuscular problems.
patients with low back pain (LBP). The purpose of
or pelvic tilt taping (PPTT) with Kinesio tape as
or pelvic tilt angle.

amateur swimmer with a Cobb's angle (L1–S1) of
th medial buttock areas and sacroiliac joints. We
mes per week for an average of 9 h each time).
bb's angle (L1–S1) had decreased from 68° to 47°
n 45° to 31°. Reductions in hypomobility or motion
and in pain, as measured by the pain-provocation
tock areas in the prone position, the patient felt no
e low back area while performing forward flexion
hen washing dishes in the sink.
intervention favourably affected the pelvic incli-
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PAIN® 152 (2011) S90–S98

PAIN®
www.elsevier.com/locate/pain

Review

Moving differently in pain: A new theory to explain the adaptation to pain

Paul W. Hodges *, Kylie Tucker
The University of Queensland, Centre for Clinical Research Excellence in Spinal Pain, Injury and Health, Brisbane Qld 4072, Australia

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

1. Introduction

People move differently in pain. Although this statement is unquestioned, the underlying mechanisms are surprisingly poorly understood. Existing theories are relatively simplistic, and although their predictions are consistent with a range of experimental and clinical observations, there are many observations that cannot be adequately explained. New theories are required. Here, we seek to consider the motor adaptation to pain from the micro (single motoneuron) to macro (coordination of whole-muscle behaviour) levels and to provide a basis for a new theory to explain the motor changes in pain.

2. Contemporary theories of the motor adaptation to pain

depending on function of the muscle, comes from studies of induced pain in muscles such as the erector spinae during gait [2] and forward bending [105]. In these cases, activity increased when the muscle is normally inactive and decreased when the muscle is normally active. Furthermore, during dynamic leg movements, muscle pain decreased agonist muscle electromyographic activity (EMG) and increased antagonist muscle EMG [24]. At a micro level, observations of reduced motoneuron discharge rate (a determinant of muscle force) during constant force contractions were interpreted to be consistent with this theory [15,80]. The pain adaptation theory proposed that the inhibitory and excitatory inputs were mediated at the spinal cord (via interneurons) from nociceptive afferents onto
although the mechanisms

Change in rotational moment arms (MA) with hip flexion

Muscle description	Abbreviation	MA at 0° flexion	MA at 90° flexion	ΔMA
Gluteus medius (Anterior compartment)	GMED 1	7 (10)	58 (2)	51 (12)
	GMED 2	−11 (10)	55 (6)	66 (10)
	GMED 3	−20 (8)	39 (8)	59 (9)
(Posterior compartment)	GMED 4	−41 (16)	22 (10)	63 (25)
Gluteus minimus (Anterior compartment)	GMIN 1	18 (16)	35 (14)	17 (20)
	GMIN 2	−10 (5)	42 (6)	52 (10)
(Posterior compartment)	GMIN 3	−30 (6)	26 (18)	56 (21)
Gluteus maximus (Anterior compartment)	GMAX 1	−20 (13)	46 (8)	66 (7)
	GMAX 2	−26 (18)	33 (6)	59 (18)
	GMAX 3	−28 (12)	13 (6)	41 (7)
	GMAX 4	−29 (14)	1 (3)	30 (14)
	GMAX 5	−15 (3)	−3 (3)	12 (3)
(Posterior compartment)	GMAX 6	−18 (10)	−12 (7)	6 (3)
Piriformis		−29 (7)	14 (7)	43 (5)
Iliopsoas		2 (2)	−4 (5)	−6 (4)
Quadratus femoris		−22 (7)	−27 (11)	−5 (16)
Obturator internus		−30 (3)	−7 (4)	23 (3)
Obturator externus		−14 (2)	−26 (4)	−12 (4)

1. The average for the four specimens and one standard deviation (in parantheses) is reported in mm.
2. Rotational moment arms were measured over a range of hip rotation, but only the moment arm at 0° hip rotation is reported here.
3. Positive moment arm indicates internal rotation; negative moment arm indicates external rotation.
4. A positive number in the ΔMA column indicates an increasing internal rotation moment arm, a decreasing external rotation moment arm, or a switch from external rotation to internal rotation moment arm.

Delp,

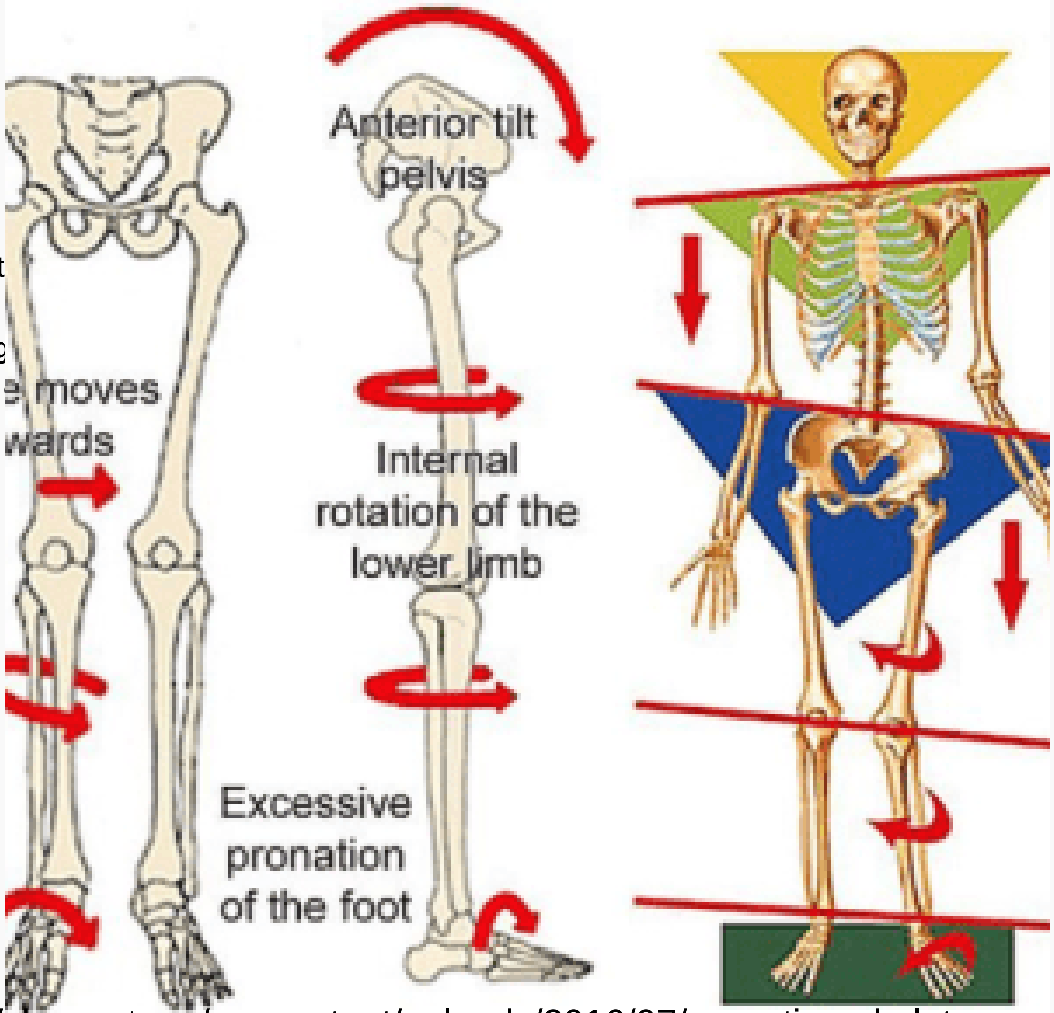
Navicular drop is associated w/ ACL injury (Beckett, 1992)

Induced hyper-pronation did not significantly change pelvic tilt, but shank IR was associated with pelvic alignment (Kahmis, 2015)

Posit

Chang

alignment



https://i2.wp.com/sbrsport.me/wp-content/uploads/2016/07/pronation-skeleton.png?ssl=1

Clinical Question

Does a routine pelvic alignment prevent an ACL tear from reoccuring among female patients with previous ACLR?

P= females with previous ACLR

I= routine pelvic alignment

C= none

O= preventing ACL re-tear

Search Criteria

Inclusion criteria

- CEBM Level 4 minimum through Level 2 maximum
- written in English
- hip asymmetry evaluation
- intervention to align hip asymmetry
- female subjects

Exclusion criteria

- animal studies
- literature reviews
- systematic reviews

The Search

PubMed

PEDro

SportDiscus

None of the studies met the inclusion/exclusion criteria...

pelvis alignment and acl prevention- 0 articles

pelvis asymmetry and acl- 0 articles

hip alignment and acl- 55 articles

hip correction and acl- 10 articles

Pelvis correction and acl- 57 articles

Now What?

https://emojipedia-us.s3.dualstack.us-west-1.amazonaws.com/thumbs/120/apple/155/face-palm_1f926.png

Results...

Level of Evidence	Study Design/ Methodology of Articles Retrieved	Number Located	Author (Year)
2	Prognosis case/control-cohort	2	Hertel (2004) Loudon (1996)

LOWER EXTREMITY MALALIGNMENTS AND

Table 1. Descriptive statistics of injured and uninjured limbs. Each limb is treated as a single subject. Uninjured limbs (n = 24) are from healthy control subjects and are side-matched to the ACL-injured limbs (n = 24). Data are means (±SD).

	Uninjured Limbs	Injured Limbs
Hip In		
Hip Ex		
Innom		
Navicu		
Q-Ang		
Month		

* denot

Table 3. Adjusted odds ratio for the relationship between navicular drop, innominate rotation and ACL injury status. The regression model has an R^2 value of 0.42.

Measure	Odds Ratio	95% Confidence Interval for Odds Ratio	p
Navicular Drop			
<0.63 cm	1.00		
0.63-0.80 cm	16.43	(1.65,163.97)	.02*
>0.80 cm	20.25	(1.83, 223.77)	.01*
Innominate rotation			
<1.0°	1.00		
1.0° – 3.89°	1.12	(0.21, 5.92)	.90
>3.89°	5.22	(0.90, 30.13)	.05*

* $p \leq 0.05$.

Short le

Hip IR/E

Pelvic til

And relationship w/ACL

)4

istory of Twenty) had no tilt, hip tatistical gender, ılar drop history ıcreased of this ...males to tearing their ACLs more than males.

KEY WORDS: Hyperpronation, navicular drop, pelvic tilt, quadriceps angle.

(Hertel 2004)

The Relationship Between Static Posture and

	Anterior Cruciate Ligament-Injured			Normals			Chi-Square	p value
	Norm	Abnormal		Norm	Abnormal			
		High	Low		High	Low		
Pelvic position	3	17	0	12	6	2	9.00*	0.003
Hip position	11	0	9	6	0	14	2.78	0.096
Sagittal knee position	2	18	0	15	5	0	11.27*	0.001
Frontal knee position	2	0	18	2	0	18	1.00	0.317
Hamstring length	6	0	14	11	0	9	2.27	0.132
Navicular drop	4	15	1	14	6	0	7.14*	0.008
Subtalar joint position	5	14	1	15	4	1	8.33*	0.004

* *Significant value ($p < 0.05$) included the variables of pelvis, knee position, navicular drop test, and subtalar joint position.*

TABLE 4. *Classification of anterior cruciate ligament-injured and normals for seven variables (N = 20 for each group).*

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Clinical Bottom Line & Recommendation

There is Grade D evidence supporting the current PICO question.

This grade is assigned due to limited case-control studies that extrapolate current evidence to help answer the current PICO.

There is a need for inception cohort studies to investigate the risk ratio and prevalence of ACL tear and hip correction.

Terminology

- Mulligan- named after Brian Mulligan, the creator of the technique
- Uses a combination of osteokinematics and arthrokinematics to correct positional faults of joints
- Positional faults could lead to altered movement and pain and altered movement and pain…
- Mobilization With Movement

Terminology

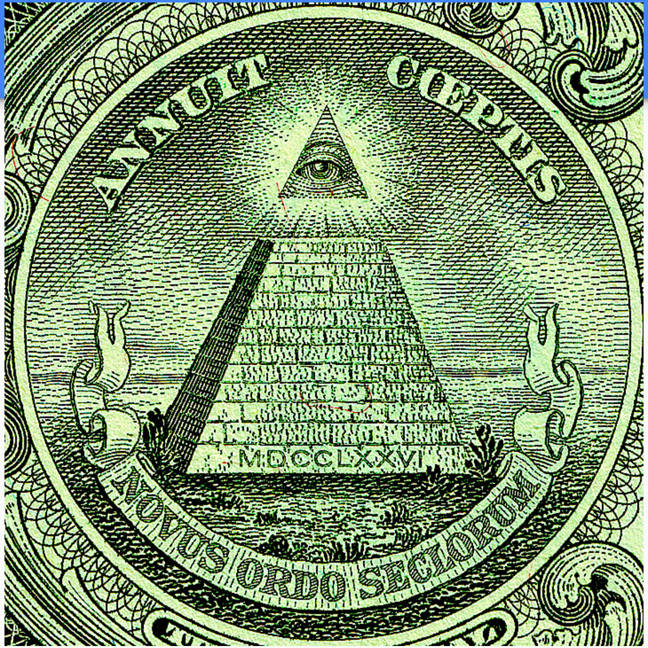
- Muscle Energy Technique- manual treatment utilizing voluntary muscle contractions to correct alignment
- Clinician uses resistance to assist the voluntary contraction torque
- The resulting muscle contraction causes positional faults to be corrected

Hmmm…

http://d2trtkcohkrm90.cloudfront.net/images/emoji/apple
/ios-10/256/thinking-face.png

●https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwi4t5Pji8vWAhWCiVQKHYRDD4EQjRwIBw&url=https%3A%2F%2Fwww.dreamstime.com%2Fstock-illustration-all-roads-lead-to-rome-motivational-inspirational-poster-representing-proverb-sayings-simple-human-pictogram-image50884791&psig=AFQjCNHk67rGPufhihTazASm3EAQcn-wzQ&ust=1506798289513833

Key Anatomy



- First Things First…
  - Eye Dominance
  - The Key to 'True' observation

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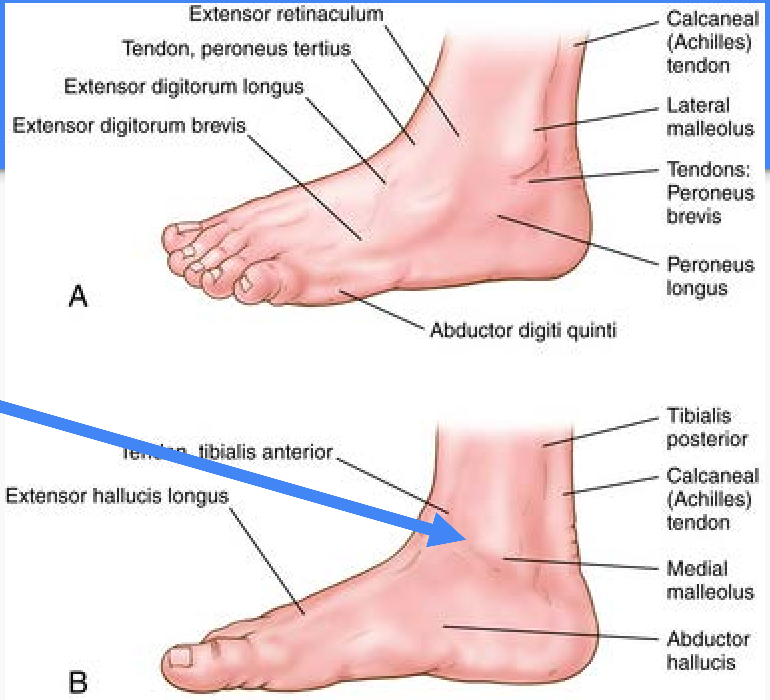
Key Anatomy

- Medial Malleoli
    - Hook w/ thumbs



https://clinicalgate.com/wp-content/uploads/2015/03/B9781455725311000171_f08-06ab-9781455725311.jpg

Key Anatomy

- ASIS
  - Hook with thumbs

Key Anatomy

- Iliac Crest
  - Place your hands on the ‘table’

Key Anatomy

- PSIS
  - Dimples…just inferior and medial…

Key Anatomy

- Sacral Bases
    - Medial and superior at a 45 deg. Angle from PSIS

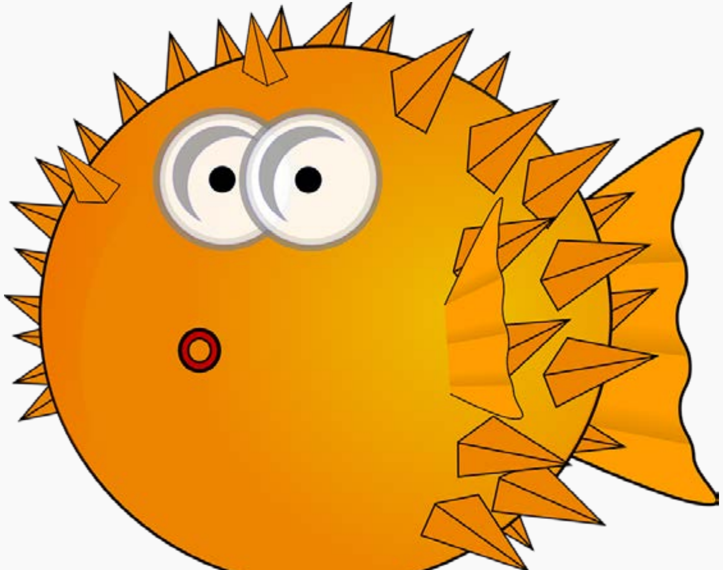
Correcting Common Asymmetries

An evaluation and treatment protocol used for addressing hip alignment issues uses PUFRS:

Willson-Barstow Manuver

P -Pubic Symphysis
U -Up Slip
F -Out or In Flare
R –Rotation (Ant. Or Post.)
S –Sacrum/Lumbar

(Hoban, 2001)



I need help!

Let’s look at evaluating hip alignment (Hoban, 2001)

AND treating using ME and MWM (Hoban 2001; Hing et al. 2015)

Can we have a Tribute??

Pubic Symphysis

- Shot gun technique
- I don’t assess due to patient population…
- But I correct…

https://i.ytimg.com/vi/BJkYRgptHKc/maxresdefault.jpg

Up Slip

- Check Table top and Med. Malleoli
- Hip Traction…couple ways…
  - ME way-
  - Active Kick way-

Flares

- Hook Medial Aspect of ASIS
- Look at Hip ER/IR
- Couple ways to correct…
  - ME way
  - Mulligan way

Rotations

- Hook inferior to ASIS
  - Could also manifest at Med. Malleoli
- Most are Anterior Rotations in Personal Clinical Experience
- ME way Supine
- ME way side lying

Sacrum (Lumbar first)

- The lumbar is the key to the sacrum
- Correct lumbar rotation first
    - Check depth of facet joint
    - Use MWM SNAG

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Sacrum

- For our talk today…
- Address Backward Torsions
  - Check Sacral Bases for depth of palpation
  - Use Mulligan to correct

○https://www.google.com/imgres?imgurl=https%3A%2F%2Fi.ytimg.com%2Fvi%2FRauz-k6XA2g%2Fmaxresdefault.jpg&imgrefurl=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DRauz-k6XA2g&docid=Eel58fwIhfEQ4M&tbnid=nntw-HcvzeFVTM%3A&vet=10ahUKEwjb4JzOn8TWAhXJz4MKHXbbCx8QMwhfKC0wLQ..i&w=1280&h=720&bih=662&biw=1366&q=mulligan%20SI%20correction&ved=0ahUKEwjb4JzOn8TWAhXJz4MKHXbbCx8QMwhfKC0wLQ&iact=mrc&uact=8

Lab Time

- Take your partner at your table through the evaluation and treatment process.
  - PUFRS
- Remember…this is only practice
- Be strict in your visual and sensual observation of alignment
- In the real world, correct only what you find… (Pubic breaks this rule)

Regroup

Regional Interdependence is defined as:

“...the concept that a patient’s primary musculoskeletal symptom(s) may be directly or indirectly related or influenced by impairments from various body regions and systems regardless of proximity to the primary symptom(s).”   (Sueki, 2013)

Clinical Application

Case 1: WBB athlete C/O non-dominant Lat. Ankle Pn (7/10). N KMOI “Feels like I’m walking on the outside of my foot”

Case 2: WTN athlete C/O lower L abdominal Pn (7/10) especially while serving. N KMOI. Site of Pn is non-dominant side

Case 3: WTN athlete C/O L Post Knee Pn (7/10) in non-dominant side. R/O chasing down ball in backcourt and stopping abruptly before colliding into fence. R/O ‘weakness and pain’

Common Denominators

- Up slip on side of CC
- Out Flare on side of CC
- Once hips properly evaluated and corrected
    - MCID of pain reduction in the site of the CC within 24 hrs. NPR of 0 at day seven.


IT'S ALL IN THE HIPS
FACEBOOK.COM/BJJPROBLEMS

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