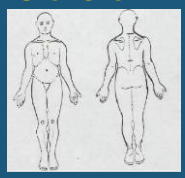
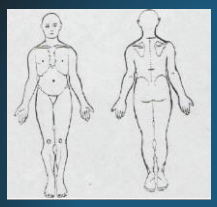
HIP CASE STUDY 1



Orthopaedic Manual Physical Therapy Series
Charlottesville 2017-2018

Eric Magrum DPT, OCS, FAAOMPT



Body Chart - Initial Hypothesis:

- Groin/ADD Strain
- Gluteal Tendonopathy
- Athletic Pubalgia
- Psoas Strain
- Osteitis Pubis
- Femoral Neck Stress Rxn --> Fracture
- Labral Tear
- FAI

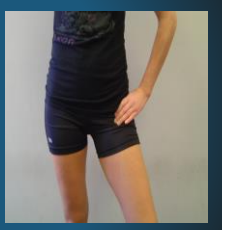
London 2012
We've got the Olympics in us!

- Professional Middle distance runner
- 2004 Olympic Trials in the 800 meters, where he missed the final by .04 of a second.
- Two time All-American indoors
- Two time NCAA outdoor championships qualifier
- Latter part of his collegiate, and recent post collegiate experience was marked by injury

SUBJECTIVE EXAM

** Subjective Asterisks Signs/Symptoms **
(Aggravating/Easing Factors, Description/Location of symptoms, Behavior, Mechanism of injury)

- 3 month – Insidious onset - Training
- "Deep non specific" Anterior, groin, lateral, posteriolateral (L) Hip pain
- "C sign"
- Occasional "catching"
- Pain with Running faster, Jumping/basketball, lifting/carrying
- Rest – No running x 2.5 months; Stretch/yoga
- PMHx: (L) fibular, ® tibial stress fracture
- X-ray (-)
- Referral to PT



Primary HYPOTHESIS after Subjective Examination:

- **Labral Pathology**

Differential List: (List in ranking order to screen/clear - Rule out)

- **Fem Neck Stress Fracture**
- **Lumbar referral**
- **FAI**
- **OA/DJD**
- **Osteitis Pubis**
- **Athletic Pubalgia**
- **Gluteal tendinopathy**

Diagnostic accuracy of clinical tests of the hip: a systematic review with meta-analysis *Br J Sports Med* (2012)

Michael P Reiman,[1] Adam P Goode,[1] Eric J Hegedus,[2] Chad E Cook,[3] Alexis A Wright[2]

Diagnostic test	Number studies sample size (n)	SN (95% CI)	SP (95% CI)	-LR (95% CI)	+LR (95% CI)
Femoral Fracture					
Patellar-Pubic Percussion	3 (n=782) [50–52]	95 (92 to 97)	86 (78 to 92)	0.07 (0.03 to 0.13)	6.11 (3.73 to 10.02)

(-)

- **Testing for femoral shaft stress fractures**

Fulcrum Test

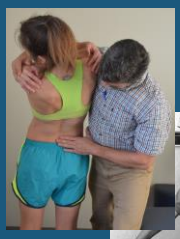
- **(+) Reproduce pain at Femoral shaft**

SN/SP (95% CI)	LR+	LR-
93 (NR)/75 (NR)	3.7	0.09
88 (NR)/13 (NR)	1.0	0.92

(-)

Lumbar Clearing

- Full AROM
- Quadrant
- (-) Neuro Exam
  - SLR/Slump



Evidence-Based Diagnosis and Treatment of the Painful Sacroiliac Joint

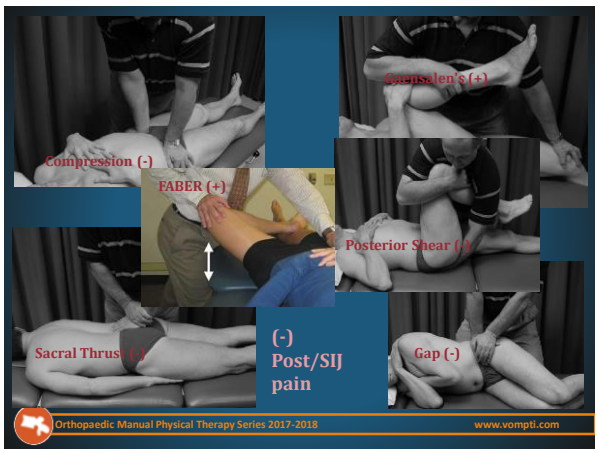
Mark Laslett, FNZCP, PhD, Dip MT, Dip MDT

TABLE 1. Comparison between Laslett M et al[31] and van der Wurff et al[20] studies of the validity of multiples of positive pain provocation SIJ tests.

Diagnostic accuracy statistic	Number of positive provocation SIJ tests: 1 or more		2 or more		3 or more		4 or more		5 or more	
	ML	PvW	ML	PvW	ML	PvW	ML	PvW	ML	PvW
Sensitivity %	100	100	93	93	91	85	60	26	27	0
Specificity %	44	42	66	58	78	79	81	82	88	100
Positive LR	1.8	1.7	2.7	2.2	4.3	4.0	3.2	1.4	2.1	0
Negative LR	0.0	0.0	0.10	0.13	0.08	0.19	0.49	0.91	0.84	1.00

Notes:

1. LR = likelihood ratio, ML = Laslett M et al 2005, PvW = van der Wurff et al 2006
2. The shaded cells represent the optimal number of positive SIJ provocation tests producing the highest positive likelihood ratio, i.e., 3 or more.
3. The tests included in this study are distraction, compression, thigh thrust, Gaenslen's test, sacral thrust, and Patrick's FABER test.



Development of a Clinical Prediction Rule for Diagnosing Hip Osteoarthritis in Individuals With Unilateral Hip Pain

- Squat – Aggravates Sx (+)
- Active Flexion < 115 (-)
- (+) Scour – Lateral Hip/Groin pain (-)
- (+) Pain with active hip EXT (-)
- Passive IR < 25 (-)

Number of Predictors Present	Positive Likelihood Ratio (95% CI)	Negative Likelihood Ratio (95% CI)
5	7.3 (1.1 to 49.1)	.87 (.73 to 1.1)
≥4	24.3 (4.4 to 142.1)	.53 (.35 to .80)
≥3	5.2 (2.6 to 10.9)	.33 (.17 to .66)
≥2	2.1 (1.4 to 3.1)	.31 (.13 to .78)
≥1	1.2 (.99 to 1.4)	.27 (.04 to 2.0)

J Orthop Sports Phys Ther 2008;38(9)

THE AMERICAN COLLEGE OF RHEUMATOLOGY CRITERIA FOR THE CLASSIFICATION AND REPORTING OF OSTEOARTHRITIS OF THE HIP

Table 4. Clinical (history, physical examination, laboratory) classification criteria for osteoarthritis of the hip, classification tree format*

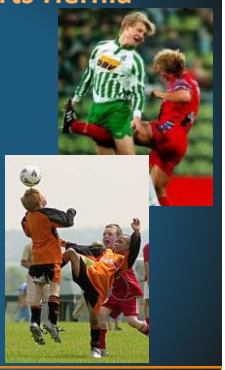
(+)	1.	Hip pain
		and
(-)	2a.	Hip internal rotation <15°
		and
(-)	2b.	ESR ≤45 mm/hour (If ESR not available, substitute hip flexion ≤115°)
		or
(-)	3a.	Hip internal rotation ≥15°
		and
	3b.	Pain on hip internal rotation
		and
(-)	3c.	Morning stiffness of the hip ≤60 minutes
		and
(-)	3d.	Age >50 years

* This classification method yields a sensitivity of 86% and a specificity of 75%. See Figure 1 for graphic depiction of this classification tree. ESR = erythrocyte sedimentation rate (Westergren).

Arthritis and Rheumatism, Vol. 34, No. 5 (May 1991)

Athletic Pubalgia/"Sports Hernia"

- Males > Females
- Deep, intense unilateral Pain - Lower ABD/Groin – referral to perineum, inner thigh, scrotum
- High level athlete -Cutting, jumping, kicking, running sports (10-15% soccer)
- Repetitive overload > Specific Mechanism
- Aggs: Sudden accel/decel, twist/turn/cut; kick; sit ups, cough/sneeze
- (+) Pain with resisted Sit up +/- ADD
- Ease: rest – usually can play through with limitations, does not improve with rest (sxs return with return to sport)



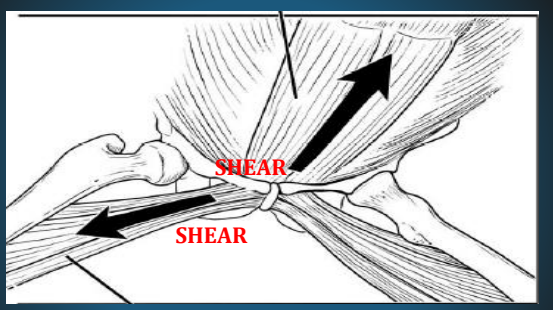
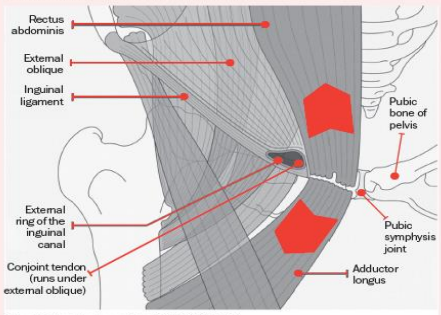


Figure 1: Anatomy of the groin region

Large red arrows indicate the direction of force of the rectus abdominis and adductor longus muscles



Omar I M et al. Radiographics 2008;28:1415-1438

Diagnostic accuracy of clinical tests of the hip: a systematic review with meta-analysis

Br J Sports Med (2012)

Michael P Reiman,[1] Adam P Goode,[1] Eric J Hegedus,[2] Chad E Cook,[3] Alexis A Wright[2]

Table 6 Summary of articles reporting on the diagnostic accuracy of OSTs for pathologies of the hip: sports related chronic groin pain

Test, authors	Subjects	Age (mean, SD)	Gender	Pathology	Symptom duration	SN/SP (95% CI)	LR+/LR-	Q	Criterion standard Criterion Standard SN/SP (95% CI)	Reliability
Single Adductor Test										
Verrall et al[69]	89 Australian Rules football players	NR	89 M	Bone marrow oedema	NR	30 (NR)/91 (NR)	3.3/0.66	7	MRI 78 (NR)/88 (NR) [64]	NR
Squeeze Test										
Verrall et al[69]	89 Australian Rules football players	NR	89 M	Bone marrow oedema	NR	43 (NR)/91 (NR)	4.8/0.63	7	MRI 78 (NR)/88 (NR) [64]	NR
Bilateral Adductor Test										
Verrall et al[69]	89 Australian Rules football players	NR	89 M	Bone marrow oedema	NR	54 (NR)/93 (NR)	7.7/0.49	7	MRI 78 (NR)/88 (NR) [64]	NR

(-)

Physical Therapy in Sport 14 (2013) 3–16

Contents lists available at SciVerse ScienceDirect

Physical Therapy in Sport

journal homepage: www.elsevier.com/ptsp

Masterclass

A suggested model for physical examination and conservative treatment of athletic pubalgia

Eric J. Hegedus [a], Ben Stern [b], Michael P. Reiman [c], Dan Tarara [d], Alexis A. Wright [a,*]

Diagnostic accuracy of clinical tests of the hip: a systematic review with meta-analysis

Michael P Reiman,[1] Adam P Goode,[1] Eric J Hegedus,[2] Chad E Cook,[3] Alexis A Wright[2]

Br J Sports Med (2012)

Table 8 Pooled diagnostic properties and for the diagnosis of labral tear, femoral fracture and gluteal tendinopathy

Diagnostic test	Number studies sample size (n)	SN (95% CI)	SP (95% CI)	-LR (95% CI)	+LR (95% CI)
Labral Tear					
FADDIR (MRA)	4 (n=128) [40 41 43 44]	94 (88 to 97)*	8 (2 to 20)*	0.48 (0.20 to 1.16)	1.02 (0.96 to 1.08)
FADDIR (Arthroscopy)	2 (n=157) [42, 43]	99 (95 to 100)	7 (0 to 34)	0.15 (0.01 to 2.24)	1.06 (0.92 to 1.21)
Flexion IR	3 (n=42) [45–47]	96 (82 to 100)	17 (12 to 54)	0.27 (0.03 to 2.34)	1.12 (0.83 to 1.51)

Diagnostic accuracy of clinical tests for the diagnosis of hip femoroacetabular impingement/labral tear: a systematic review with meta-analysis

M P Reiman,[1,2] A P Goode,[1] C E Cook,[1] P Hölmich,[3,4] K Thorborg[3,5]

CONCLUSION

Owing to the low quality and biased sampling of patients with high probability of disease, hip physical examination tests do not appear to currently provide the clinician any significant value in altering probability of disease with their use. Currently, only the FADDIR and Flex-IR tests are supported by the data as valuable screening tests for FAI/LT pathology. Further studies involving high quality designs across a wider spectrum of hip pathology patients are necessary to discern the confirmed clinical utility of these tests.

Br J Sports Med 2015;**49**:811.

Impingement Test/FADDIR

- Flex knee 90 degrees – FLEX, ADD, INT Rot + Overpressure
- (+) Groin Pain
- Pain with IR = Anterior labrum

(+)

SN/SP (95% CI)	LR+/LR-
100/all (+) (FAI); 99 (NR)/25 (NR) (labral tear)	NA/NA (FAI); 1.3/0.04 (labral tear)
99 (NR)/5 (NR)	1.0/0.2
97 (NR)/13 (NR)	1.1/0.23
78 (59 to 89)/10 (3 to 29)	0.86/2.2
100/all (+) (FAI); 97 (NR)/4 (NR) (labral tear)	NA/NA (FAI) 1.0/0.75 (labral tear)
59 (NR)/75 (NR)	2.4/0.55

Scour Test

- Circumduction of hip - multidirectional
- Axial force - Compression
- (+) Hip Pain (-)
- Hip OA

SN/SP (95% CI)	LR+/LR-
50 (26 to 74)/29 (12 to 51)	0.70/1.72

Br J Sports Med (2012)

Quadrant Test

- Flexion, ADDuction, IR
- Axial Compression
- (+) Hip Pain
- Intra articular Pathology

(+)

SN/SP (95% CI)	LR+/LR-
75 (19 to 99)/43 (18 to 72)	1.3/0.58

Active/Resisted SLR

(+)

- Palpate post aspect Greater Trochanter
- (+) Poor dynamic stability - Psoas/Illiacus (facilitated TFL) secondary to Incr Ant Fem head translation
- Resisted SLR at 30 degrees
  - Stinchfield Test
- (+) Reproduce groin pain, suspect labral pathology

Log Roll Test

- Used to assess labral pathology/loose body (+ mechanical signs/sxs)
- Maximally IR & ER
- Eliciting a click or popping sensation
- Also screen capsular laxity

(-)

Fitzgerald/McCarthy Test

- Assess Anterior Labrum
- Flexion, EXT Rot, ABD →
- IR Rot, ADD, EXT
- (+) reproduce pain, popping or catching
- Sn = 98%

(+)

Thomas Test

- Bilateral knee flexion
- Lumbar spine flat/no lordosis
- Knee flexed to 90 – Extend Hip
- Assess EXT, ABD/ADD, Rotation
- Hip EXT < 10 EXT = Psoas/capsule tightness/dysfunction (end feel)
- Hip EXT > 10 EXT = Anterior capsule laxity
- Assess Rectus Fem - extend knee increased Hip EXT
- Assess TFL/ITB tightness/dysfunction – ABD increase hip EXT

(+)

Systematic review

The validity and accuracy of clinical diagnostic tests used to detect labral pathology of the hip: A systematic review

Manual Therapy (2011)

Roanna M. Burgess [a,*], Alison Rushton [b], Chris Wright [b], Cathryn Daborn [a]

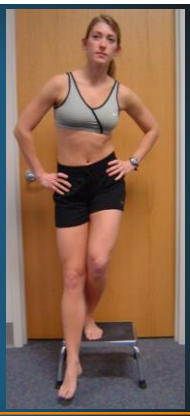
- Studies - Poor methodology
- "Cluster of Tests"
- Anterior groin Pain
- Mechanical Symptoms
- (+) Quadrant Test
- (+) IMP/FADDIR Test (Sn = 75%, Sp = 43 - 100%)
- (+) Fitzgerald Test (Sn = 98%)
- (+) Modified Thomas Test (Sp = 92%)

Biomechanical Screen

(+) Step Down Test:

Trendelenberg, Femoral

ADD/IR, Early heel rise



Biomechanical Screen

(+) Swing Test:

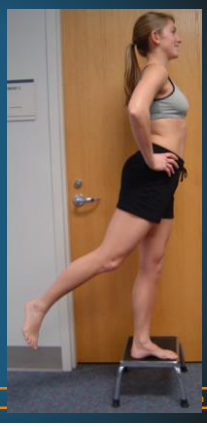
(L) - Poor stability; ®

Decreased Hip EXT,

Excessive Pelvic ant

rotation, Lumbar rotation

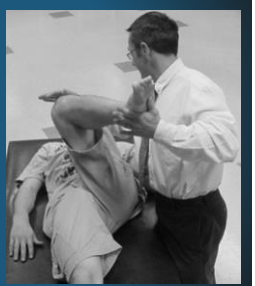
at terminal swing



**** Physical Exam "Asterisks" Signs/Symptoms ****

(Special Tests, Movement/Joint Dysfunction, Posture, Palpation, etc.)

- Full pain free Lumbar AROM
- (-) Neuro Exam (SLR, Slump, Ely's)
- (-) SIJ provocation cluster
- (+) FADDIR
- (+) Quadrant
- (+) Resisted SLR
- ROM limitations: IR, Flexion, ER, EXT – capsular tightness
- TTP: Psoas (hypertonic); Glut tendon



Are the relationships between the areas on the body chart, the interview, and physical exam consistent?
"Do the "Features Fit" a recognizable clinical pattern?" – If "Yes" – what : _____

Labral Pathology – Partial Tear with FAI

CLINICAL PRACTICE GUIDELINES

KEELAN ENSEKI, PT, MS • MARCIE HARRIS-HAYES, DPT, MSCI • DOUGLAS M. WHITE, DPT • MICHAEL T. CIBULKA, DPT
JUDITH WOEHRLE, PT, PhD • TIMOTHY L. FAGERSON, DPT • JOHN C. CLOHISY, MD

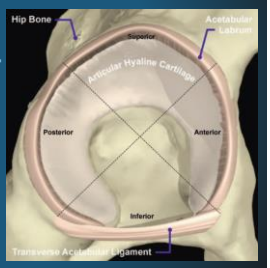
Nonarthritic Hip Joint Pain

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability and Health From the Orthopaedic Section of the American Physical Therapy Association

J Orthop Sports Phys Ther. 2014;44(6):A1-A32. doi:10.2519/jospt.2014.0302

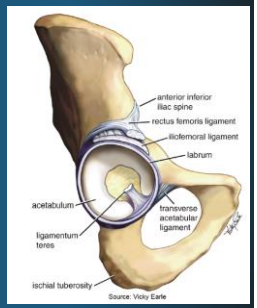
Labral

- **Mechanism**
  - Traumatic: Twist/Pivot
    - EXT ROT in EXT
  - Repetitive micro trauma
  - Normal degeneration
- **Presentation**
  - Anterior>Lateral>Posterior Hip pain
  - Mechanical Signs/Sxs (catching, locking, giving way)
  - "Instability" – Rotational mvts (laxity); "Pinching" pain - Sitting/hip flexion (FAI)



Labrum

- Inner 2/3 is Avascular, only outer 1/3 potential to heal
- Labrum is Innervated, potential for pain generator
- Tears can be degenerative, dysplastic, traumatic and idiopathic
- Most labral tears are Anterior-Superior

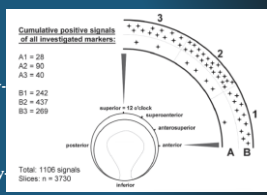


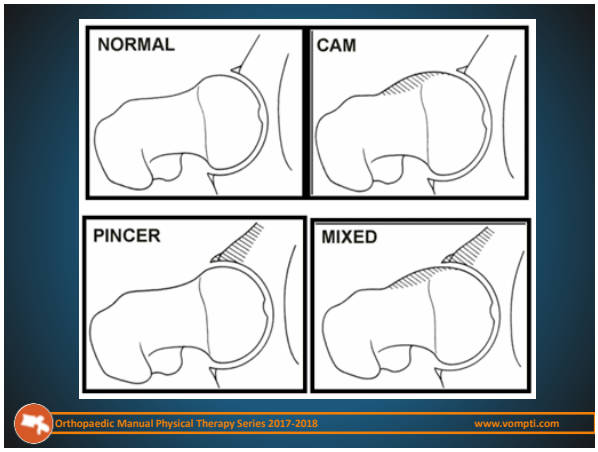
The distribution of nociceptive innervation in the painful hip

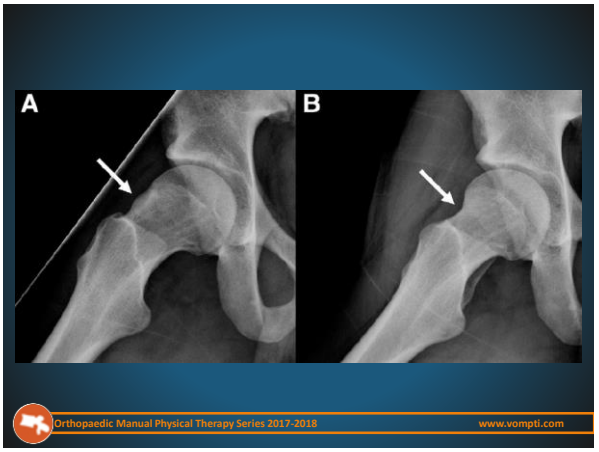
A HISTOLOGICAL INVESTIGATION

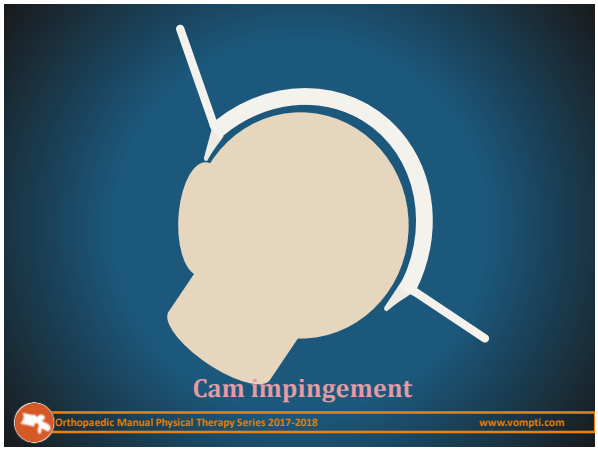
Bone Joint J 2013;95-B:770–6.

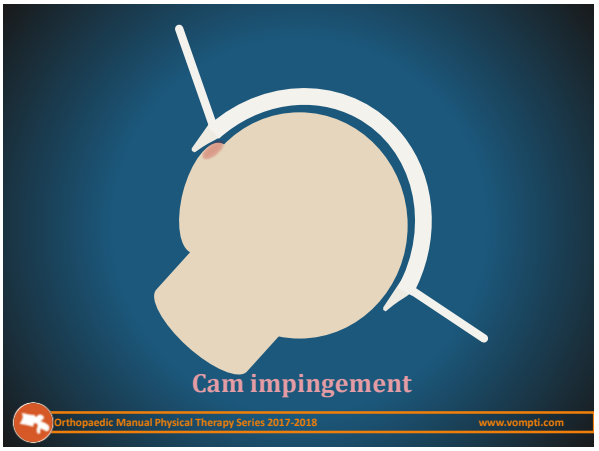
- Labrum contains nerve fibers for nociceptive and proprioceptive
- Small proportion of pain-specific positive signals (nociception and substance P)
- Larger number of unspecific somatosensory-related positive signals
- Proprioceptive function for the labrum
- The highest concentration of somatosensory-associated marker expression can be found close to the acetabular attachment.

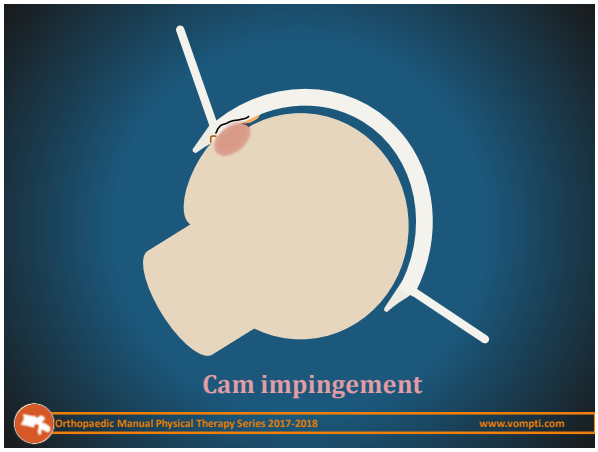


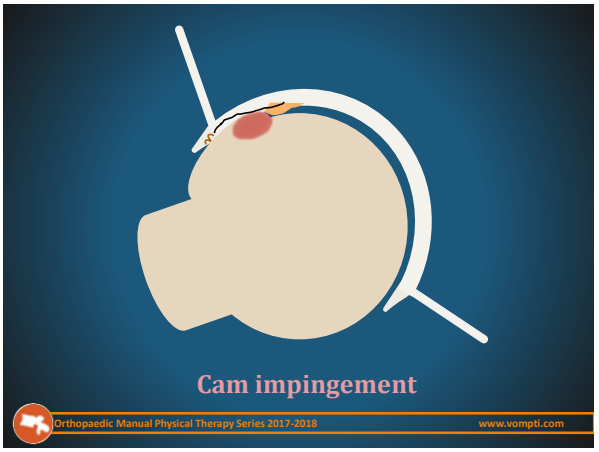


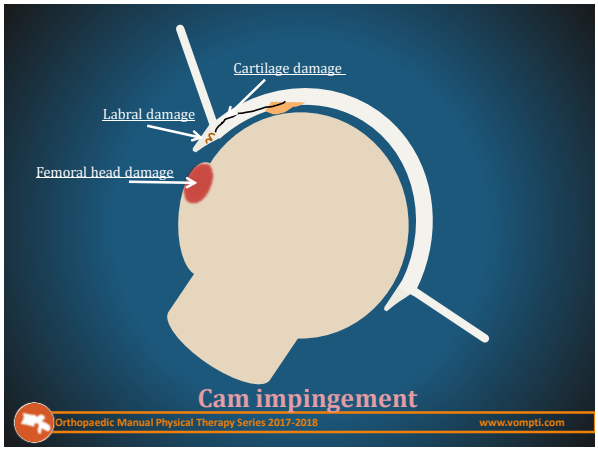


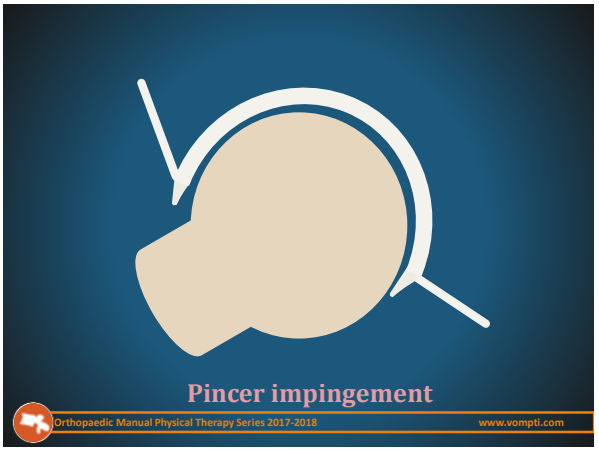


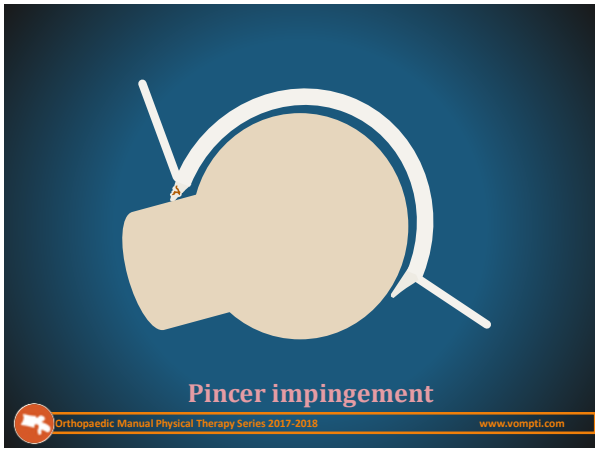


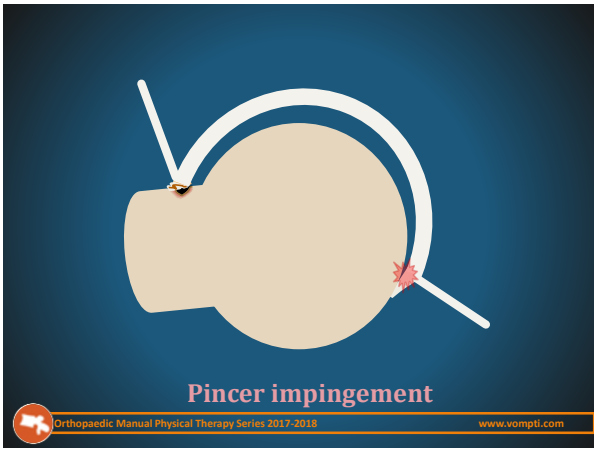


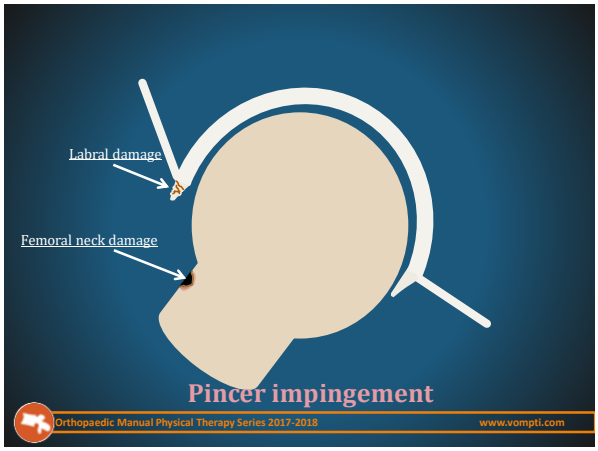


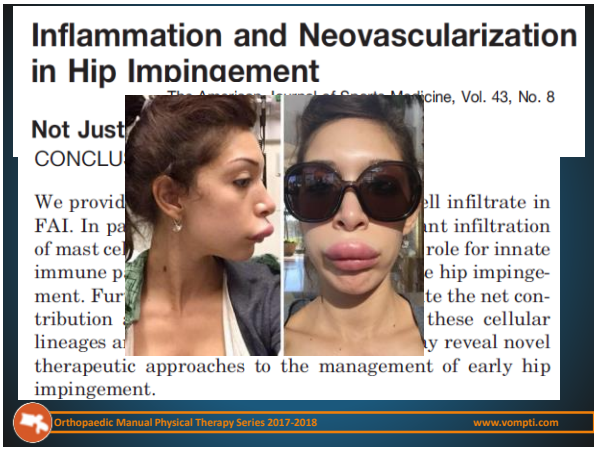






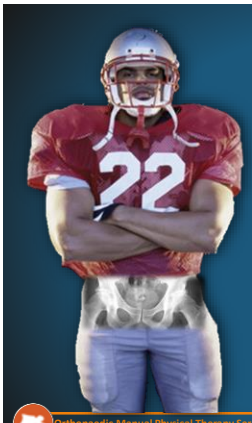


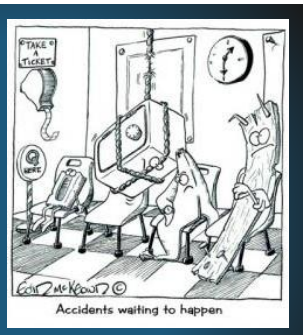




Who is at risk?

Morphology	Activity	Trouble?
Normal	Normal	
Normal	Supraphysiologic	
Abnormal	Normal	
Abnormal	Supraphysiologic	





Athlete with high risk morphology

FAI and Compensatory Motions

Marc R. Safran, MD

Physical Therapy Plan

- Manual Therapy
- Exercise Prescription: Progression
  - Hip ERs: Activation/Timing
  - Lumbo Pelvic Stability
  - Neuromuscular Re-education
  - Lower Quarter Alignment
  - Eccentric Strengthening
- 1x/week x 8 weeks

Response/ Re assess	Treatment	Running
	1st: Manual Therapy– Hip mobilizations (Post, Lat, Inf) STM – Psoas, Gluts PROM **Hip ER activation**	**None**
Decreased anterior hip sxs. Eliminate posterior hip pain Increased ROM Flexion, Ext, IR, ER	2nd: Manual – Hip mobs STM/MFR – Psoas, Gluts Lumbopelvic Stabilization. Dynamic hip stabilization	Run 15 minutes pain free
(-)FADDIR Increased anterior hip pain following basketball	3rd: Manual – Hip mobs; STM – Psoas, Gluts. Progress dynamic hip stabilization	Run 20 minutes pain free

Pelvic Rotation in Femoroacetabular Impingement Is Decreased Compared to Other Symptomatic Hip Conditions

CONCLUSION

J Orthop Sports Phys Ther 2016

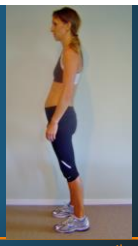
RESULTS FROM THIS STUDY SUGGEST that people with symptomatic FAI with cam deformity have decreased posterior pelvic rotation during active hip flexion when compared to people with other symptomatic hip conditions and people with healthy hips. Limited posterior pelvic rotation during hip flexion may be an underlying mechanism of symptom onset in people with FAI with cam defor-

Effect of Changes in Pelvic Tilt on Range of Motion to Impingement and Radiographic Parameters of Acetabular Morphologic Characteristics

Am J Sports Med 2014 42: 2402

James R. Ross,*†‡ MD, Jeffrey J. Nepple,§ MD, Marc J. Philippon,§ MD, Bryan T. Kelly,‖ MD, Christopher M. Larson,¶ MD, and Asheesh Bedi,*†‖ MD

- 10 degrees increased Anterior pelvic tilt reduced IMP free ROM of IR 5 – 9 degrees
- Posterior pelvic tilt increased the IMP free ROM



Posterior Rotation Innominate – Mobilization/MET

Femoral Anterior Glide with Medial Rotation

2) Imprecise spinning of femoral head during hip flexion

Precise rotation

Anterior glide

Sahrmann S

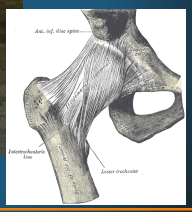
Posterior Glide at 90 Flexion

Psoas Mobilization

- Passive Strumming – Cranial → Caudad
- Inhibitive Pressure – Shortened position
- Active Lengthening
  - Int/Ext Rotation
  - Heel Slide
  - Ant/Post Pelvic Tilt

Psoas/Capsular Mobility

- Posterior Pelvic tilt
- Tighten Glute
- Vary Direction of Lunge
- Vary Hip INT/EXT Rot



Rectus Fem > Psoas typically

"Asses not Assume"

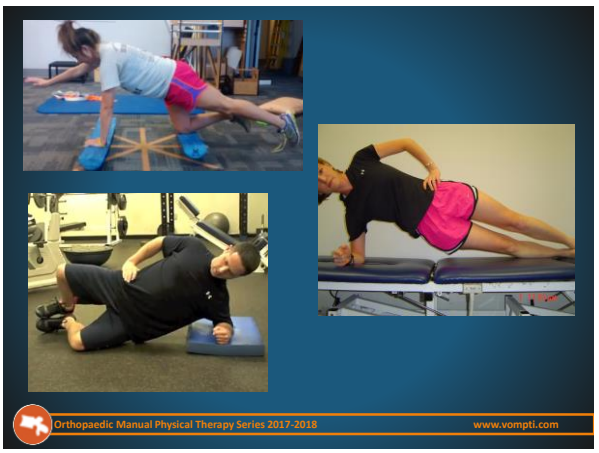
Don't over stretch anterior hip capsule and/or Psoas if hypermobile

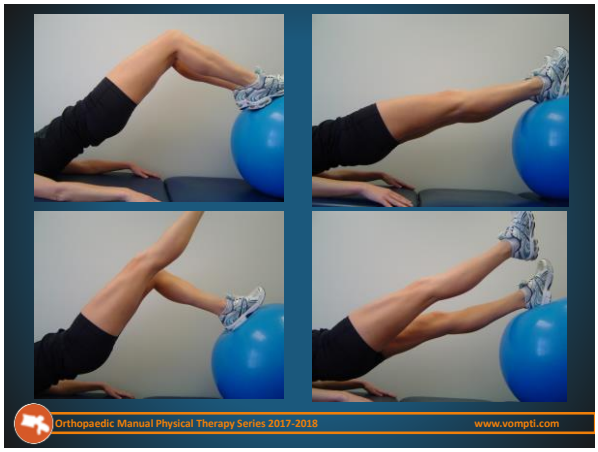
The Influence of Varying Hip Angle and Pelvis Position on Muscle Recruitment Patterns of the Hip Abductor Muscles During the Clam Exercise

- Gluteus maximus/medius activation greater pelvis was in neutral
- Gluteus medius activation was greatest when the hip was flexed to 60°.
- Activation of the tensor fasciae latae was not influenced by pelvis position or hip angle.

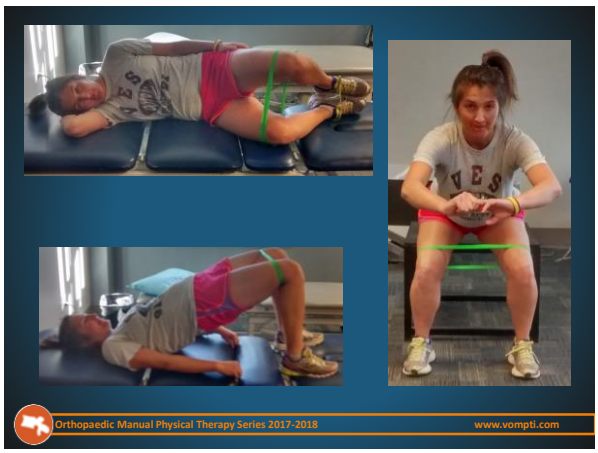
JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 43 | NUMBER 5 | MAY 2013

Response/ Re assess	Treatment	Running
	1st: Manual – Hip mobilizations (Post, Lat, Inf) STM – Psoas, Gluts. Hip ER activation	None
Eliminate posterior hip pain **Decreased anterior hip sxs.** **Increased ROM Flexion, Ext, IR, ER**	**2nd:** **Manual Therapy – Hip mobs STM/MFR – Psoas, Gluts PROM** **Lumbopelvic Stabilization** **Dynamic hip stabilization**	**Run 15 minutes pain free**
(-)FADDIR Increased anterior hip pain following basketball	3rd: Manual – Hip mobs; STM – Psoas, Gluts. Progress dynamic hip stabilization	Run 20 minutes pain free



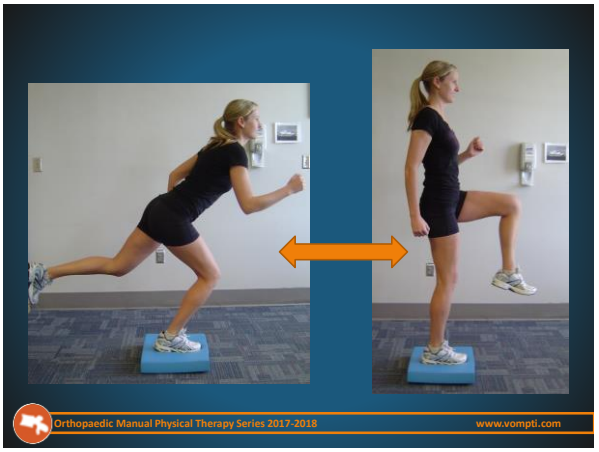


Response/ Re assess	Treatment	Running
	1st: Manual – Hip mobilizations STM – Psoas, Gluts. Hip ER activation	None
Decreased anterior hip sxs. Eliminate posterior hip pain Increased ROM Flexion, Ext, IR, ER	2nd: Manual – Hip mobs STM/MFR – Psoas, Gluts Lumbopelvic Stabilization. Dynamic hip stabilization	Run 15 minutes pain free
(-)FADDIR **Increased anterior hip pain following basketball**	**3rd:** **Manual Therapy – Hip mobs** **STM – Psoas, Gluts** **PROM** **Progress dynamic hip stabilization**	**Run 20 minutes pain free**



Response/Re assess	Treatment	Running
(-) Resisted SLR **No anterior hip pain at rest/AM**	**4th:** **Manual Therapy-** **Hip mobs** **STM – Psoas** **PROM** **Progress Gluteal strengthening – activation/timing**	**Run 20 minutes 3x/week – pain free**
Step Down (-) Trendelenberg Continued improving hip sxs	5-7th visits: Manual- Hip mobs STM Psoas Progress LQ alignment	Running 25 minutes 3x/week pain free
Step Down: (-) dynamic valgum No ant hip "soreness" following running	8th visit: Manual Hip mobs STM Psoas Progress eccentric strengthening	Run faster pace Hill work out

Response/Re assess	Treatment	Running
(-) Resisted SLR No anterior hip pain at rest/AM	4th: Manual Therapy- Hip mobs STM – Psoas Progress Gluteal strengthening – activation/timing	Run 20 minutes 3x/week – pain free
Step Down (-) Trendelenberg **Continued improving hip sxs**	**5-7th visits:** **Manual Therapy - Hip mobs** **STM - Psoas** **PROM** **Progress LQ alignment**	**Running 25 minutes 3x/week pain free**
Step Down: (-) dynamic valgum No ant hip "soreness" following running	8th visit: Manual Hip mobs STM Psoas Progress eccentric strengthening	Run faster pace Hill work out



Response/Re assess	Treatment	Running
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Step Down: (-) dynamic valgum **No ant hip "soreness" following running**	**8th visit:** **Manual Therapy -** **Hip mobs** **STM – Psoas** **PROM** **Progress eccentric strengthening**	**Run faster pace** **Hill work out**

- Faster pace run
- Hill workout
- Return of all anterior hip symptoms
- (+) FADDIR
- (+) Quadrant
- (+) Thomas Test
- (+) Resisted SLR

- ? Advanced Imaging
- ? Intra Articular Hip injection

Systematic review

The validity and accuracy of clinical diagnostic tests used to detect labral pathology of the hip: A systematic review

Roanna M. Burgess [a,*], Alison Rushton [b], Chris Wright [b], Cathryn Daborn [a]

Recommendations:

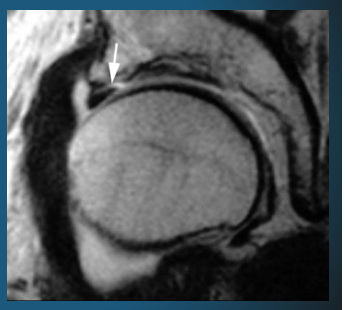
MRA preferred imaging method for patients with suspicion of a labral tear

> 95% accuracy with 3 views

Manual Therapy (2011)

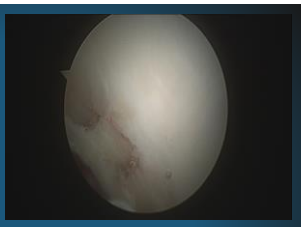
Advanced Imaging

- MRA – Slight Irregularity of free edge of superior labrum suggestive of fraying



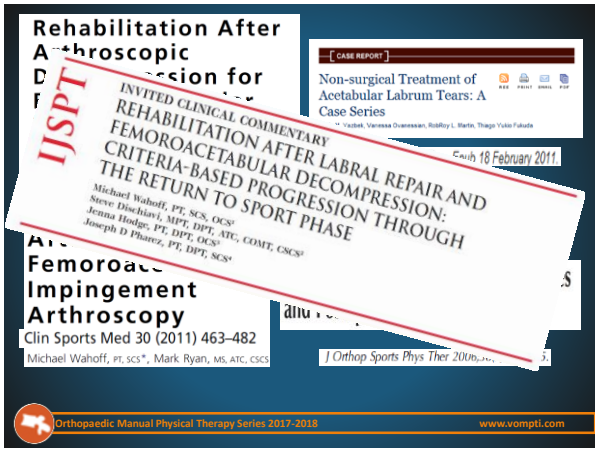
- Intra articular Hip injection – No benefit

- Diagnostic Arthroscopy



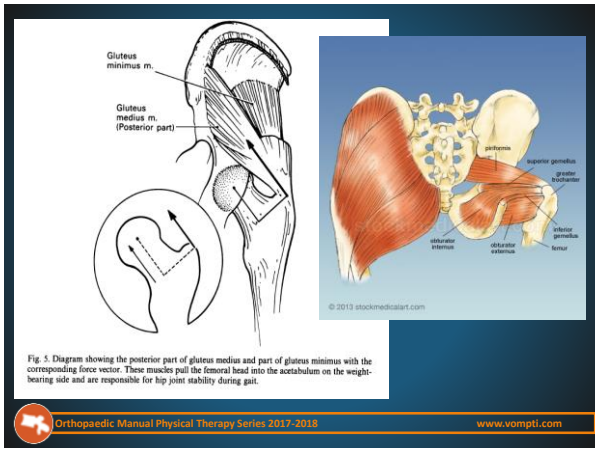
- Extensive Synovectomy – anterior/posterior
- Chrondroplasty

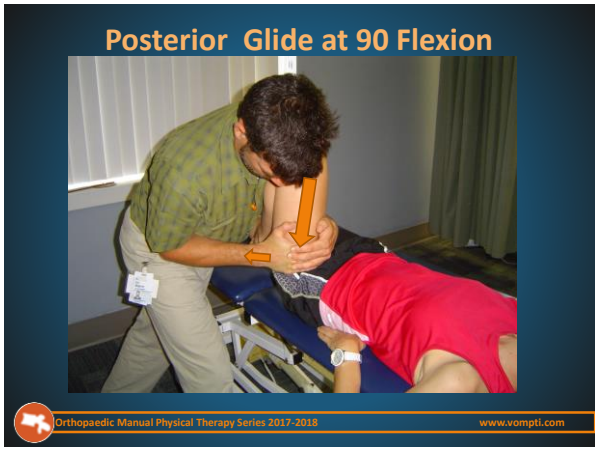
- Labral repair
  - Anterior
  - Anterolateral

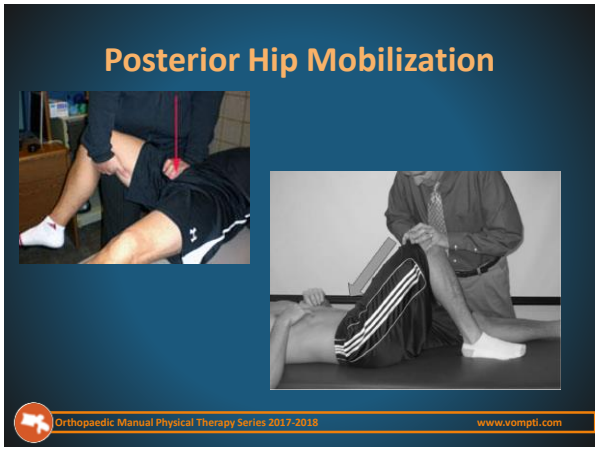


Post Operative

- WB 20# crutches x 3 weeks
- ROM – Int/Ext Rotation, Flexion to tolerance; EXT
- Joint Mobilizations (Gr I/II) – Distraction, Distraction in Flexion; Lateral distraction in Flexion
- Soft Tissue Mobilization – Rectus Fem, Psoas, Illiacus, ADDs, Gluts
- Hip Proprioception/Kinesthesia
- Glut Activation – Medius/Minimus
- Pelvic/Trunk Stability



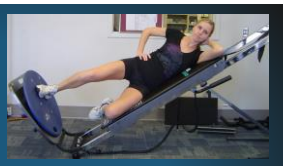


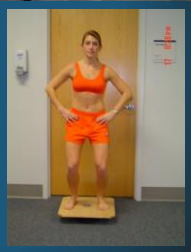


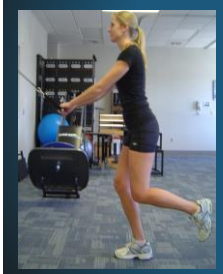
Self Posterior Capsule Stretch

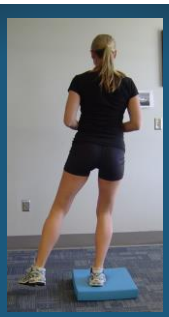
3 weeks post op

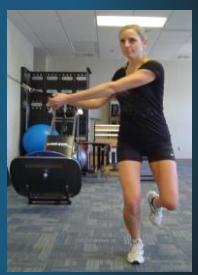
- D/C crutches
- Slight c/o Ant hip pain
- Continue Manual Therapy
- Improving ROM – Flexion, ER limitation
- Proprioception
- Bilateral Strengthening – Closed Chain





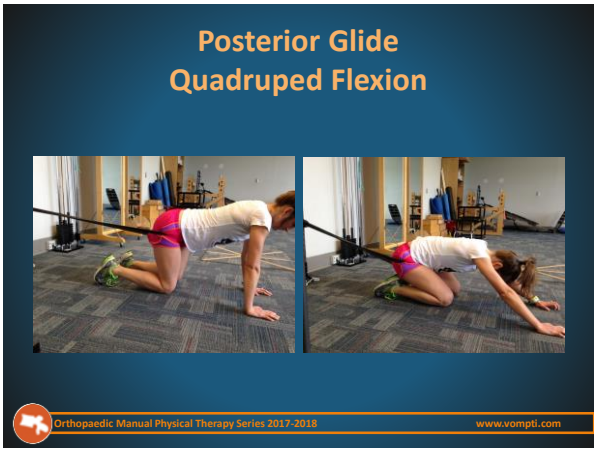


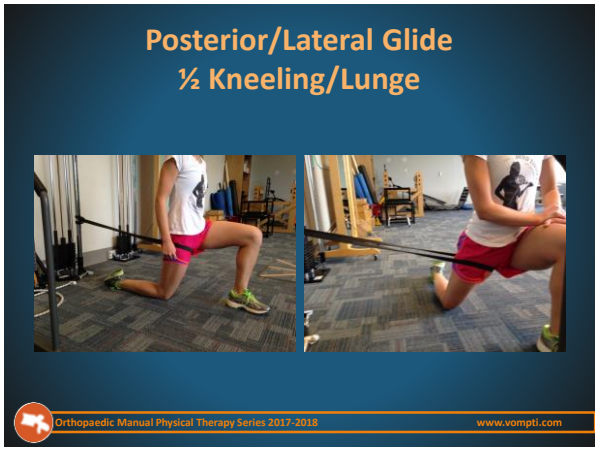




4 Weeks Post Operative

- Pain free ambulation
- No Ant hip pain
- Progressing toward full ROM all planes – limited Flexion, Ext Rot
- Progress unilateral stance activities





http://newordermobility.blogspot.com/2016/01/

5 Weeks Post Operative

- Decreased functional strength with unilateral stance activities
  - Step Down Test – Fem ADD/IR, Slight Trendelenberg
- Began yoga – Modified poses
- Progressed Dynamic Stabilization - Proprioception

6 Weeks Post Op

- Follow up with MD
- Cleared to began return to run progression
- Ran 10 minutes
- Slight anterior hip tightness following
- Manual Therapy
- Progress dynamic hip stabilization

- Running 10 minutes 3x/week
  - Observational Gait Assessment
    - Fem ADD/IR throughout stance, medial heel whip at terminal stance.

7 Weeks post op

Patient or Problem	Intervention	Comparison Intervention	Outcomes

- **In a runner s/p Chrondroplasty/labral repair what are factors for pain free return to running?**

Article Reviewed: _____

What did you learn from article to apply to your specific patient/clinical case?

The effects of cam femoroacetabular impingement corrective surgery on lower-extremity gait biomechanics

Gait & Posture 37 (2013) 258–263

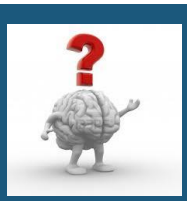
The effects of cam femoroacetabular impingement corrective surgery on lower-extremity gait biomechanics

Gait & Posture 37 (2013) 258–263

- 3D lower-extremity joint kinematics and kinetics.
- Comparing preoperative and postoperative FAI groups, and a healthy control group.
- Gait Biomechanics of FAI patients did not return to normal after surgery.
  - Reduced hip frontal and sagittal plane ROM
  - Smaller peak Hip ABD and INT ROT moments
  - Decreased peak Hip power
- Reductions in hip pain, hip impairments detected preoperatively, perhaps due to modified gait patterns, persisted postoperatively.
- ??? Further research is required to confirm the reasons for which lower-extremity gait mechanics of FAI patients do not return to normal following surgery ???

Lower Extremity Injuries: Is It Just About Hip Strength?

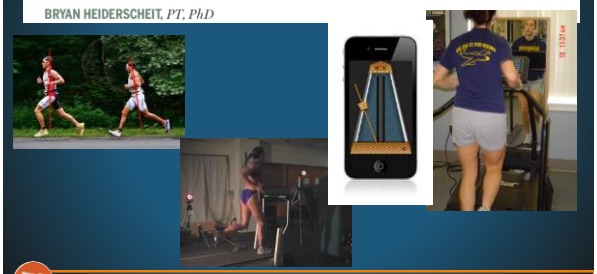
BRYAN C. HEIDERSCHEIT, *PT, PhD*



Gait Retraining for Runners: In Search of the Ideal

JOURNAL OF ORTHOPAEDIC & SPORTS PHYSICAL THERAPY | VOLUME 41 | NUMBER 12 | DECEMBER 2011

BRYAN HEIDERSCHEIT, *PT, PhD*

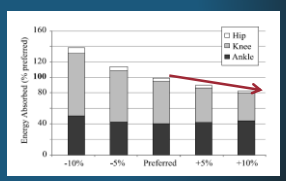


Effects of Step Rate Manipulation on Joint Mechanics during Running

Med. Sci. Sports Exerc., Vol. 43, No. 2, pp. 296–302, 2011.

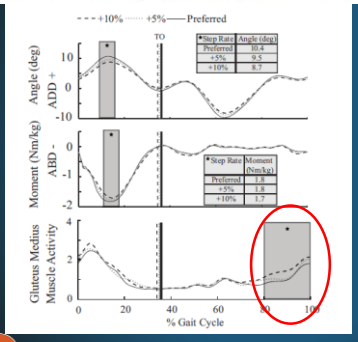
BRYAN C. HEIDERSCHEIT[1,2], ELIZABETH S. CHUMANOV[1], MAX P. MICHALSKI[1], CHRISTA M. WILLE[2], and MICHAEL B. RYAN[1]

- **Increased step rate 10%:**
  - 34% Decrease in energy absorbed at the knee > hip
  - Decreased step length
  - IC: Heel closer to COM
  - Decreased braking impulse
  - Decreased knee flexion
  - Increased leg stiffness
  - Decreased Hip ADD
  - Decreased COM vertical excursion



Changes in muscle activation patterns when running step rate is increased

Elizabeth S. Chumanov[a], Christa M. Wille[b], Max P. Michalski[a], Bryan C. Heiderscheit[a,b,*]



Significantly Increased Glut medius activation at late swing with 10% increased in step rate

Gait & Posture 36 (2012) 231–235

Mirror gait retraining for the treatment of patellofemoral pain in female runners

Richard W. Willy [a,*], John P. Scholz [b], Irene S. Davis [c] Clinical Biomechanics 27 (2012) 1045–1051

- Gait Re training – Mirror
- Significant Improvements in
  - Pain
  - Function
  - Hip IR/ADD
- Improvement in Central Processing
  - NM improvements
    - SL Squat
    - Step Down
- Maintained for 3 months