HIP ARTHROSCOPY CLINICAL PRACTICE GUIDELINE

Background

Femoroacetabular impingement syndrome (FAIS) is a common cause of intra-articular hip pain and disability. There are three types of FAIS: pincer impingement (excessive prominence of the anterolateral rim of the acetabulum), cam impingement (overgrowth of the femoral head rotating inside the acetabulum) and a combination of pincer and cam impingements (Byrd, 2010). The abnormal abutment of the proximal femur against the rim of the acetabulum produced by the FAIS causes limitations in range of motion and produces shear forces that lead to hip dysfunction, chondral abrasion, labral injuries, and eventually, full-thickness cartilage loss. (Edelstein, 2012)

Hip arthroscopy is a minimally invasive procedure used to treat FAIS and chondrolabral pathology. To address FAIS, an osteoplasty is performed to reshape the impingement lesion on the femoral and/or acetabular side (removing either the non-spherical portion of the femoral head and/or resection of the acetabular over-coverage). A labral repair, augmentation, or reconstruction is performed to address labral injuries in order to avoid disruption of joint mechanics and abnormal distribution of forces around the joint. At the end of the procedure, a routine capsular repair is performed with some patients also having a capsular plication, if warranted. Patients having a capsular plication will require increased range of motion protection during the early post-operative phase.

Disclaimer

Progression is time and criterion-based, dependent on soft tissue healing, patient demographics, and clinician evaluation. If you are working with an Ohio State Sports Medicine patient and questions arise, please contact the author by calling our office at (614) 293-2385.

Summary of Recommendations

Precautions	• Weight bearing (WB) restrictions: foot flat partial weight bearing (20%) with crutches (2 weeks) • Wean off crutches beginning of week 3 ○ 2→0 crutches preferred • Avoid any "pinch" feeling in the hip with range of motion (ROM) and exercises • Avoid hip flexor/adductor aggravation as strengthening and activity progresses
ROM/Manual Therapy	• Early motion as required to prevent adhesions • Circumduction OR no resistance upright biking for PROM • Limit external rotation and extension ROM for 4 weeks
Corrective Interventions	• Proper activation and recruitment of all hip and core musculature without compensation required prior to initiating strengthening • Neuromuscular re-education for balance and correction of faulty mechanics • Therapeutic exercise and neuromuscular re-education for lower extremity strength
Patient Reported Outcome (PRO)	• Lower Extremity Functional Scale (LEFS) at each visit • Consider collecting the Hip Outcome Score (HOS) at 1st visit, monthly, and discharge • ADL (17 items) | Sports (9 items)
Criteria to Initiate Plyometric Program	• Full, functional, pain free ROM • > 80% quadriceps, hamstring, and hip (using hand-held dynamometer) strength compared to uninvolved leg • Squat > 150% body weight (barbell squat or leg press) • 10 forward and lateral step downs from 8" step with proper mechanics
Criteria to Initiate Running Program	• Full, functional, pain-free ROM • > 80% quadriceps, hamstring, and hip (using hand-held dynamometer) strength compared to uninvolved leg • Squat > 150% BW (barbell squat or leg press) • 10 forward and lateral step downs from 8" step with proper mechanics • Hop and hold with proper mechanics (uninvolved→involved) • Ability to tolerate 200-250 plyometric foot contacts without reactive pain/effusion • No gross visual asymmetry and rhythmic strike pattern with treadmill or over ground running
Criteria for Return to Sport/ Discharge	• Physician clearance at last check-up • Strength: > 90% compared to uninvolved hip (using hand-held dynamometer) • > 90% body weight with SL leg press • Functional Performance: to date, no return-to-sport criteria have been tested and published for patients undergoing FAI. Patients participating in sports activities should complete a number of sport specific tasks prior to being allowed to return to sport. Functional performance measures listed below (Phase IV) can be utilized for return to sport participation • PROs: Score ≥ 90% *Criteria for discharge from PT is less rigorous for those not returning to sport. Ensure the patient is able to perform all ADLs and recreational activities without pain, reactive effusion, and with appropriate functional mechanics.*

Phase I: Early Post-Operative Protective Phase (0-4 weeks)

Goals	• First PT visit within 3-5 days post-op • Protect healing tissue (the surgeon may have patient wear a hip abduction brace for the first 2 weeks to prevent ER and extension, gradually wean out as they transition off crutches) • Pain and edema control (recommend compression garments/shorts to assist) • Improve pain free ROM • Normalize muscle activation
Precautions	• No sitting > 1-2 hours (avoid knees above hips) • No hip extension > 0 degrees and ER (prone) > 30 degrees for 4-6 weeks • Partial weight bearing (20%) with foot flat for first 2 weeks • Avoid twisting/pivoting • No active straight leg raises • **Avoid pain**

Crutch Progression (Week 2-4)	• Begin transition after 2 weeks (slowly wean off crutches to avoid aggravation)
	  • If microfracture is performed: foot flat PWB (20%) for first 4 weeks
	• 2 crutches → 0 crutches highly recommended to promote normalized gait mechanics
	  • 2→ 1 → 0 crutches only when appropriate to slow patient progression or to limit walking distance
	• Criteria for Community Ambulation without Crutches:
	  • 30 seconds of single leg stance without compensation (hip drop, trunk lean) or pain
	  • Normalized gait pattern without assistive device

ROM/ Stretching *If capsular plication is performed: be more conservative with ROM progression due to potential for laxity	• Circumduction or upright biking for 10-15 mins with no resistance (x2 daily)
	  • Circumduction (**Appendix A**): review mechanics with family during 1st PT visit
	  • 30° and 70° of hip flexion → 6 min each (3 mins CW, 3 mins CCW)
	  • Can be replaced with 10-15 mins of upright biking with no resistance with elevated seat, avoiding anterior pinch (x2 daily)
	• PROM (pain free): Hip flexion, abduction, gentle hip internal rotation (IR) and ER in supine
	  • Prone ER <30 deg
	  • Hip extension to neutral
	• Stretches: prone quadriceps (knee flexion), supine iliopsoas (uninvolved knee to chest)
	• Prone lying → prone prop on elbows 5-10 mins (x2 daily)
	• GENTLE scar mobilizations can begin after incisions closed

Neuro-muscular Control	*This section is 1st priority → do not progress to strengthening until muscle activation and isolated control is normalized* Isometrics: glute sets (prone, supine) bilateral and unilateral, transverse abdominis, hamstrings, quadriceps set, supine hip abduction/adduction, prone hip IR/ER
Therapeutic Exercise	Early Exercises: hooklying butterflies and reverse butterflies, quadruped cat/cow, quadruped backward rocking (hip flexion), prone hamstring curls, bridges Advanced Exercises: clamshells, supine TA marching, standing TKE→focus on pelvic stability and weight shifting
Criteria to Progress to Phase II	• Normalized gait pattern for household distances • Minimal to no reactive pain and swelling with ADLs and PT exercises

Phase II: D/C Crutches to Pain free with ADLs (4-8 weeks)

Goals	• Restore full PROM and AROM • Progressively improve strength of the proximal hip musculature (gluteals, iliopsoas, hip rotators) with minimal to no increase in pain (<2/10 on numeric pain scale) • Normalize posture and movement patterns with functional activities • Specific emphasis on sitting and standing posture to decrease stress on anterior hip capsule • Normalize gait at preferred walking speed for community distances • Tolerate ADLs without pain or limitation	
Precautions	• Avoid joint and/or soft tissue aggravation due to early/excessive progression of activity • Avoid aggressive stretching into hip extension/ER including modified Thomas test position (consider structures involved: i.e. labral repair, capsular plication, generalized laxity) • Avoid running or impact activities	

ROM/ Stretching	• Soft tissue and joint mobilization to achieve symmetrical PROM
	  • Avoid aggressive end range stretching
	• Upright bike, butterfly/reverse butterfly stretches, FABER slides, half kneeling hip flexor stretch (with pelvic tilt not forward lunge), prone IR/ER PROM
	• May benefit from referral to massage therapist if patient is developing soft tissue dysfunction/irritation (commonly affects TFL, iliopsoas, adductors)
	  • Soft tissue irritation suggests need for regression of activities and/or exercises
	  • Continually assess patient's activity level outside of PT	

Therapeutic Exercise	• Ensure appropriate gluteal activation and timing • Integrate psoas progressive exercises (**Appendix B**) <u>Early Exercises</u> • Bridge progression, quadruped progression, squats, leg press, side planks, modified forward plank, resisted side stepping (start with band at knees), prone hip extension (emphasis on glute activation)	<u>Late Exercises</u> • Prior to initiating full WB SL exercises patient should pass criteria for community ambulation and demonstrate mastery of DL tasks • Forward and lateral step ups, heel taps, standing ER on involved leg, SL Romanian dead lift, SLS with perturbations • **Pool walking may be appropriate and can be initiated once incision is healed**

Cardio-vascular Exercise	• May progress time on upright bike as tolerated
	  • Ensure patient can perform 30 mins with no resistance and without symptoms prior to adding resistance
	  • Decrease time to ≤15 min when adding resistance
	• May begin elliptical when patient demonstrates adequate hip extension, gluteal activation, and lumbopelvic stability (same criteria as above)	

Criteria to Progress to Phase III	• Symmetrical and pain free hip ROM to meet the demands of patient's activities • Symmetrical double leg squat to 70° of knee flexion • 10 repetitions of 8" step downs with good neuromuscular control • Normalized gait pattern and pain free for community distances of ambulation	

Phase III: Pain free ADLs to Return to Impact Activities (8-12 Weeks)

Goals	• Correct abnormal/compensatory movement patterns with higher level strengthening activities, **Avoid any "pinch" feeling in the hip.** • Optimize neuromuscular control/balance/proprioception • Normalize strength of hip musculature, particularly: hip extensors, hip abductors, hip adductors, hip external rotators, trunk muscular strength and endurance • Tolerate single limb support, progressing from single-> multiplanar movements requiring increased load accepting capabilities • Increase volume/intensity of aerobic activities; restore non-impact cardiovascular fitness • Initiate progressive plyometric activities • Return to run program can be initiated towards end of phase III if criteria met
Precautions	• Avoid sacrificing quality for quantity during strengthening • Avoid hip flexor/adductor inflammation as activity increases • Ensure patient maintains full flexibility and painfree ROM as strength continues to increase • Avoid aggressive stretching within this phase unless significant hypomobility noted
ROM/ Stretching	• ROM should be checked periodically to ensure that loading the hip with new exercises does not alter neuromuscular response and normal joint mechanics • Contact surgeon if there are range of motion concerns during this phase
Therapeutic Exercise	• Normalize hip musculature strength and endurance: SL deadlift, banded bridge with leg extension, resisted hip abduction, Copenhagen adductor progression, resisted ER in quadruped-> prone, front/side plank • Continue progressive LE/core strengthening: slow to fast, simple to complex, stable to unstable, low to high force • DL strengthening advancement to SL strengthening • Progress core stability tasks with emphasis on rotational and side-support tasks (Ex: Side plank progressions, kneeling chops/lifts, windmill / Plank to pike, plank over SB, Pallof press, bird dog progression) • LE strengthening tasks with multi-planar movements: emphasize core stability and hip/knee control (no valgus) during these tasks: multidirectional Lunges, BOSU squats/lunges, etc. • Proprioception: vary surfaces, add perturbations, include variety of positions
Cardio-vascular Exercise	• Dynamic warm-up initiated • Bike/Elliptical Progression: progress resistance (and cross ramp on elliptical) as tolerated • Swimming Progression: can begin freestyle kick; continue to avoid rotational kicks

Plyometrics	• Criteria to initiate plyometric program
	  • Full, functional, pain free ROM
	  • > 80% quadriceps, hamstring, and hip (using hand-held dynamometer) strength compared to uninvolved leg- abductors, adductors, extensors, external rotators
	  • Squat 150% BW (barbell squat or leg press)
	  • 10 forward and lateral step downs from 8" step with proper alignment
	• Progressive weight bearing, DL → SL demands
	  • Shuttle plyometrics (DL → SL)
	  • Forward hop and hold (uninvolved → involved)
	  • DL mini hops/place jumps
	  • Lateral hops-> shuffles
	• Proper take off/landing mechanics emphasized
	• Agility ladder can be initiated if appropriate form/tolerance to activity in progressive plyometrics

Return to Running

Walk/jog progression can be initiated towards end of phase if patient demonstrates:

- Full, functional, pain-free ROM
- > 80% quadriceps, hamstring, and hip (using hand-held dynamometer) strength compared to uninvolved leg- abductors, adductors, extensors, external rotators
- Squat 150% BW (barbell squat or leg press)
- 10 forward and lateral step downs from 8" step with proper alignment (see appendix D)
- Hop and hold with proper mechanics (uninvolved→involved x10 repetitions)
- Ability to tolerate 200-250 plyometric foot contacts without reactive pain/effusion
- No gross visual asymmetry and rhythmic strike pattern with treadmill or over ground running

Phase	Walk/Run Ratio	Total Time
1	4 min / 1 min	10-20 min
2	3 min / 2 min	10-20 min
3	2 min / 3 min	10-20 min
4	1 min / 4 min	10-20 min
5	• Jog every other day until able to run 30 consecutive minutes • Begin with 5 min walking warm up • End with 5 min walking cool down	

General Guidelines

- Allow at least one day of rest between runs
- Gradual increase in distance is priority before increased pace
- It is common for runners to experience increased pain and/or reactive edema at least x1 during this return to run progression. When pain occurs, runner must stop running immediately and rest at least 1 day before restarting program. With restart, perform last walk/jog ratio cycle completed pain free x2 before attempting the previously painful ratio cycle.

Phase IV – Return to Sport / Full Activity (3-6+ Months)

Goals	• Initiate return to run program if not initiated in phase III • Return to physically demanding jobs • Progressively return to sport or prior/desired level of function
Precautions	• Continue to emphasize proper landing mechanics (DL and SL) • Avoid progression of plyometric or sport-specific exercises if increased pain • Ensure patient maintains full flexibility and painfree ROM as strength continues to increase • Closely monitor return to sport progression
ROM/ Stretching	• Continue ROM interventions and stretches from previous phases • Include multi-planar lumbar and hip ROM/flexibility • Emphasis on dynamic warm-up (i.e. walking lunges, hurdle steps, etc.) • Monitor sport-specific stretching with gradual return to end range stretching
Therapeutic Exercise	• Hip and core strengthening with focus on pelvic stability • Maintain DL strength but emphasize SL strengthening (involved and uninvolved) for normalization of strength between extremities

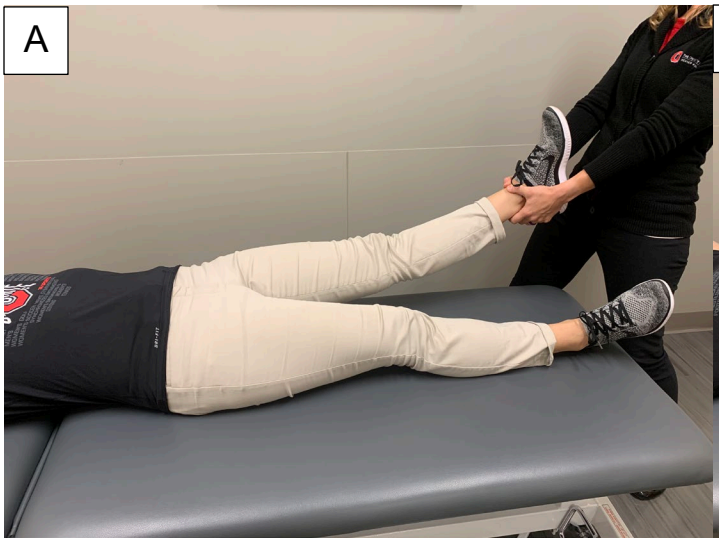
Neuro-muscular Control and Functional Performance	• Progress agility and plyometrics by adding in higher level activities (i.e. forward/backwards hopping, side shuffles, carioca, cutting, box drills, T drills, tuck jumps, DL/ SL jump turns)
	  • Focus on hip and pelvic stability
	  • Incorporate unstable surfaces with plyometrics
	• Sport specific drills in clinic (moderate speed → maximum speed)
	• **Prior to initiating speed training, patient must first complete entire return to run program without reactive pain/inflammation**
	• Ensure tolerance with DL and SL plyometrics prior to initiating power-focused or resisted, explosive training

Criteria to Return to Sport/ Discharge	• Physician clearance at last check-up
	• Strength: > 90% compared to uninvolved hip (using hand-held dynamometer)- abductors, adductors, extensors, external rotators
	• > 90% quad and hamstring strength, or SL leg press at body weight (number of repetitions to fatigue)
	• Side plank trunk endurance: >40 seconds
	• PROs: Score ≥ 90% on LEFS or HOS (ADL and Sports subscales)
	• To date, no return-to-sport criteria have been tested and published for patients undergoing FAI. Patients participating in sports activities should complete a number of sport specific tasks prior to being allowed to return to sport. Functional performance measures listed below can be utilized for return to sport participation
	• Functional Performance
	  • 90% limb symmetry with SL hop for distance, triple hop for distance, SL triple crossover hop, and SL 6-meter timed hop (with demonstration of proper LE landing mechanics)
	  • Ability to complete sport-specific drills with correct mechanics (At maximum speed without pain)
	  • Vail Sport Test (**Appendix C**)
	  • > 90% symmetry on Star Excursion Balance (posterolateral and posteromedial), Edgren Side Step Test (**Appendix D**), T-Test (**Appendix E**), Illinois Agility Test (**Appendix F/G**)

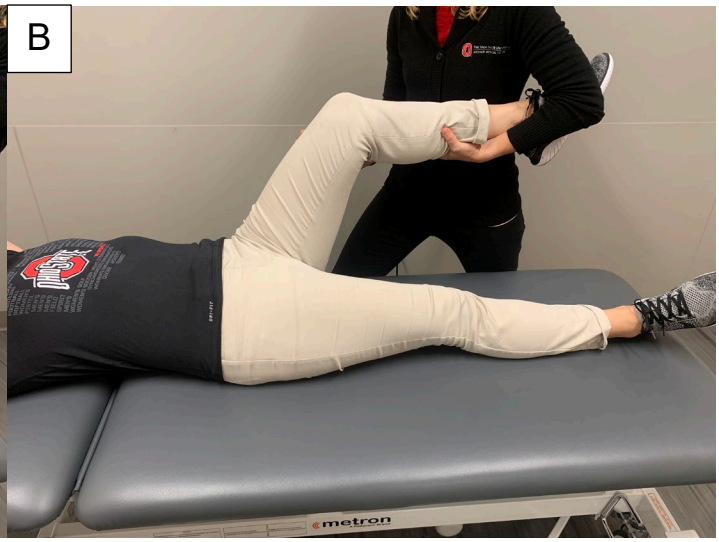
Appendix A: Circumduction

Place patient in supine and lift involved leg to either 30 degrees (A) or 70 degrees (B) of hip flexion. Instruct patient to stay completely relaxed during circumduction to avoid hip flexor aggravation. Perform clockwise and counterclockwise circles for 3 minutes each in both positions (total of 12 minutes if able to perform in both positions). In order to avoid fatigue, you may also place patient's leg on the PT's shoulder to assist with the circumduction at 70 degrees of hip flexion. If patient is unable to achieve 70 degrees of hip flexion without anterior hip pain, only perform at 30 degrees. It is best to educate patient and caregiver on how to do this maneuver at 30 degrees pre-operatively (if possible) and review with patient and caregiver at the first post-operative PT visit. It is most important to be performing circumduction at home at 30 degrees first. If caregiver is able to perform independently with patient at 70 degrees in the clinic, then this can be added to the patient's home program.

A

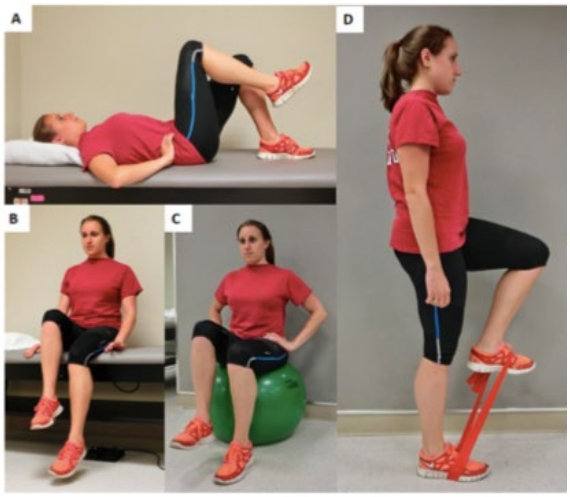


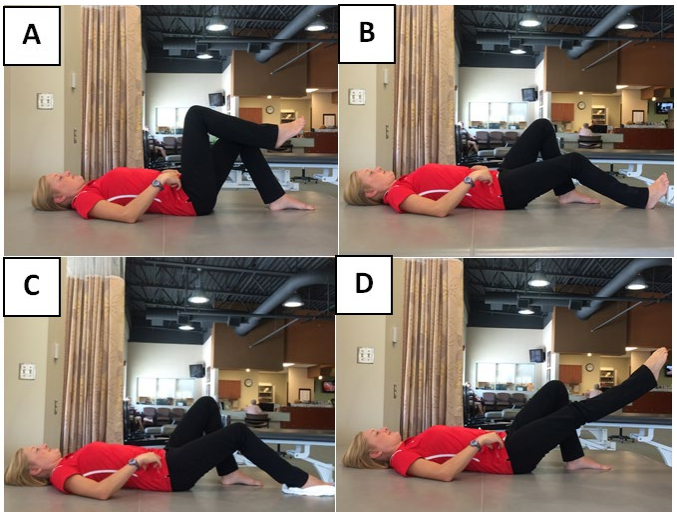
B



Appendix B: Psoas Progression

Clinicians may choose either of the two iliopsoas strengthening progressions based on clinician/patient preference. **All exercises are performed with simultaneous abdominal drawing in maneuver and lumbar spine in neutral alignment.**





A) Supine short-lever hip flexion	A) Marching
B) Seated hip flexion	B) Walk Outs
C) Seated hip flexion on Swiss ball	C) Heel Slide (cue pt not to dig heel into table OR perform without touching the table)
D) Standing hip flexion with theraband resistance	D) Heel Slide with SLR (can raise leg from step/bolster if pain is present or if too difficult to lift from ground); raise leg only to height of opposite leg
Tyler TF, Fukunaga T, Gellert J. Rehabilitation of soft tissue injuries of the hip and pelvis. *Int J Sports Phys Ther*. 2014;9(6):785-797.	Dewitt, JD. Non-surgical/post-op management. Presented at: APTA's NEXT Conference & Exposition; June 5, 2015; National Harbor, MD.

Appendix C: Vail Sports Test

Total Points: _____/54 (Patient must score 46/54 on the test in order to pass)

Single Leg Squat (Goal: 3 minutes): subject must perform each repetition at a cadence of 1 second up and 1 second down against resistance of a sportcord (placed under the foot of the leg that the test is being performed on).

	Yes (1) No (0)	Minute 1	Minute 2	Minute 3
1. Knee flexion angle between 30° and 60°				
2. Patient performs repetitions without dynamic knee valgus				
3. Patient avoids locking knee during extension				
4. Patient avoids patella extending past the toe during knee flexion				
5. Patient maintains upright trunk during knee flexion				

Single Leg Squat Total Points **_____/15**

If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 1-minute timeframe).

Lateral Bounding (Goal: 90 seconds): subject performs a lateral hopping motion against resistance of a sportcord attached to the subject's waist via a belt and on the other end to an immoveable object that is level with the waist. The injured leg is positioned as the inside leg or the leg closest to the wall. The patient is instructed to hop from one leg to the other (leg length distance), absorbing energy while they land by bending at the knee and hip. Landing boundaries (distance of the hop) are demarcated on the floor with two pieces of tape, one of which begins at the point of resistance of the sportcord as it is stretched away from the wall and the other is the measured distance of the subject's leg length from the first piece of tape.

	Yes (1) No (0)	1st 30 seconds	2nd 30 seconds	3rd 30 seconds
1. Knee flexion angle is 30° or greater during landing				
2. Patient performs repetitions without dynamic knee valgus				
3. Patient performs repetitions within landing boundaries				
4. Landing phase does not exceed 1 second in duration				
5. Patient maintains upright trunk during knee flexion				

Lateral Bounding Total Points **_____/15**

If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 30 second timeframe).

Forward Jogging (Goal: 2 minutes): subject performs forward jogging against resistance of the sportcord with the belt around waist. The patient is instructed to hop from one leg to the other in an up and down manner (similar to jogging in place) while using proper form and absorbing energy with each landing by bending at the knee and hip.

	Yes (1) No (0)	Minute 1	Minute 2
6. Knee flexion between 30° and 60°			
7. Patient performs repetitions without dynamic knee valgus			
8. Patient performs repetitions within landing boundaries			
9. Patient avoids locked knee during extension			
10. Landing phase does not exceed 1 second in duration			

11. Patient maintains upright trunk during knee flexion		

Forward Jogging Total Points **_____/12**

If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 1-minute timeframe).

Backward Jogging (goal: 2 minutes): subject performs backward jogging against resistance of the sportcord with the belt around waist. The patient is instructed to hop from one leg to the other in an up and down manner (similar to jogging in place) while using proper form and absorbing energy with each landing by bending at the knee and hip.

	Yes (1) No (0)	Minute 1	Minute 2
12. Knee flexion between 30° and 60°			
13. Patient performs repetitions without dynamic knee valgus			
14. Patient performs repetitions within landing boundaries			
15. Patient avoids locked knee during extension			
16. Landing phase does not exceed 1 second in duration			
17. Patient maintains upright trunk during knee flexion			

Backward Jogging Total Points **_____/12**

If patient repeats error on 3 consecutive repetitions after correction, they are not eligible to receive a point for that particular standard (within each 1-minute timeframe).

Garrison JC, Shanley E, Thigpen C, et al. The reliability of the Vail Sport Test™ as a measure of physical performance following anterior cruciate ligament reconstruction. *Int J Sports Phys Ther*. 2012;7(1):20-30.

Appendix D: Edgren Side Step Test

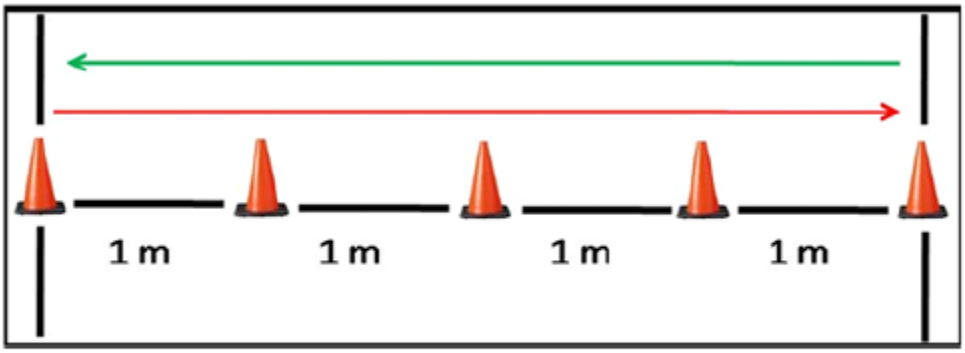


Figure 1.
Edgren Side Step Test.

- Begin with 5 cones spaced in 1 m increments
- Start standing at far left cone
- On “go” command, participant sidesteps to the right until his right foot touches or crosses the outside cone or tape mark
- Participant then sidesteps left until his left foot has touched or crossed the left outside cone
- Continue sidestepping back and forth as rapidly as possible for 10 seconds
- Participant is given 1 point per completion of each 1m increment marked by a cone. If the far end lines were not reached these points were not awarded. Subject given a score of 0 if he failed to keep his trunk and feet pointed forward at all times, crossed his legs, or did not complete the course successfully

Raya MA, Gailey RS, Gaunard IA, et al. Comparison of three agility tests with male servicemembers: Edgren Side Step Test, T-Test, and Illinois Agility Test. *JRRD*. 2013; 50(7): 951-960.

Appendix E: T-Test

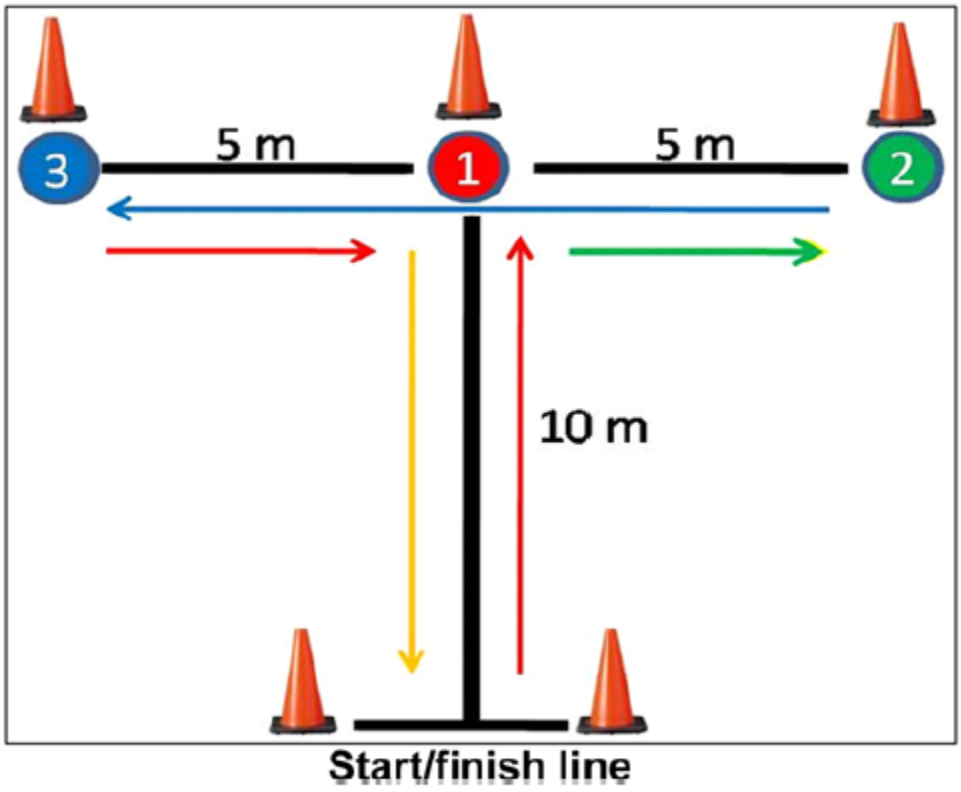


Figure 2.
T-Test.

- On the “go” command, participant runs as quickly as possible forward to the center cone
- Participant then sidesteps to the right 5 m to the right cone
- Participant then sidesteps to the left 10 m to the far left cone
- Participant then sidesteps to the right 5 m back to the center cone
- Participant runs backwards as quickly as possible to cross the finish line
- Can also perform starting with the sidesteps to the left first

Raya MA, Gailey RS, Gaunard IA, et al. Comparison of three agility tests with male servicemembers: Edgren Side Step Test, T-Test, and Illinois Agility Test. *JRRD*. 2013; 50(7): 951-960.

Appendix F: Illinois Agility Test

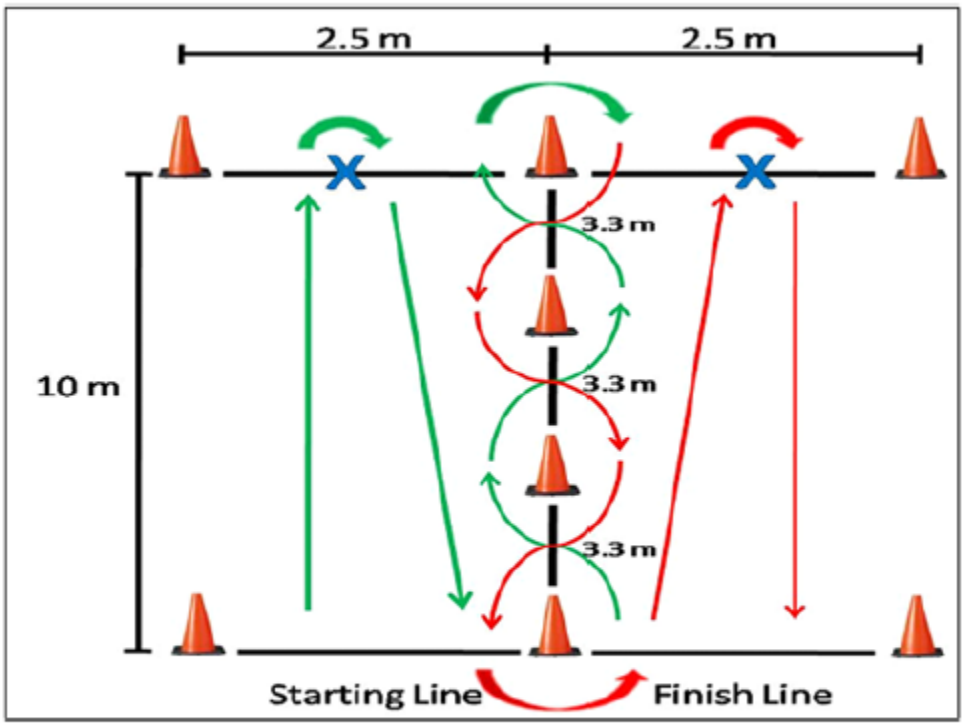


Figure 3.
Illinois Agility Test.

- Participant begins test lying prone on the floor behind the starting line with his arms at his side and his head turned to the side or facing forward
- On the “go” command, the participant ascends to his feet and runs as quickly as possible to the first tape mark. Participant is required to touch or cross the tape mark with their foot
- Participant turns around and moves back to first center cone, where he weaves up and back through the four center cones
- Participant runs as quickly as possible to the second tape mark on the far line, where required to touch or cross the end-line tape marks with their foot
- Participant then turns around and runs as quickly as possible across the finish line
- Test disqualified if participant failed to run the course as instructed, failed to reach the end lines, failed to complete the course, or moved any cones

Raya MA, Gailey RS, Gaunard IA, et al. Comparison of three agility tests with male servicemembers: Edgren Side Step Test, T-Test, and Illinois Agility Test. *JRRD*. 2013; 50(7): 951-960.

Appendix G: Modified Illinois Agility Test (performed in both directions):

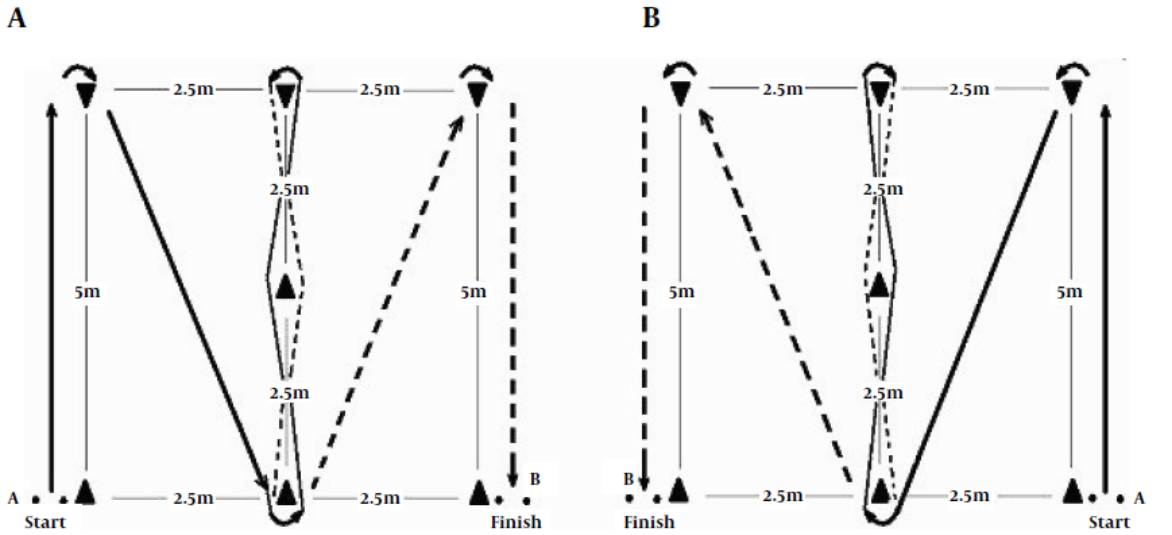


Figure 1. A, Diagram of the modified illinois change of direction test (MICODT); B, the inverted modified illinois change of direction test (I|MICODT).

Rouissi M, Chtara M, Berriri A, et al. Asymmetry of the modified Illinois change of direction test impacts young elite soccer players performance. *Asian J Sports Med*. 2016 June; 7(2): e33598

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