Differential Diagnosis for Management of Lateral Hip Pain: A Case Report

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ABSTRACT

Background and Purpose: Lateral hip pain is of high prevalence in the orthopedic physical therapy setting. The purpose of this case study was to determine correct and valid clinical tests to aid physical therapists in differentially diagnosing between trochanteric bursitis and gluteal tendinosis. **Methods:** A detailed literature search was conducted to determine valid clinical tests that will aid physical therapists in better differentially diagnosing lateral hip pain pathologies. **Findings:** The 5 valid clinical tests found included single limb stance, hip lag sign, Ober's test, resisted abduction, and isometric abduction. **Clinical Relevance:** By performing these 5 valid clinical tests, physical therapists can better narrow down the hip structure of concern; therefore, decreasing pain, increasing functional ability, and improving quality of life. **Conclusion:** There is a need for additional studies addressing the implementation of these 5 clinical tests and their effects on proper diagnosis among patients with lateral hip pain.

Key Words: clinical testing, muscle strain, validity

BACKGROUND AND PURPOSE

Lateral hip pain, more commonly referred to as greater trochanteric pain syndrome (GTPS), is frequently seen in the orthopedic physical therapy setting; however, there have been a plethora of causes identified for lateral hip pain.[1,2] Trochanteric bursitis, iliotibial band (ITB) friction, gluteal tendinosis, and gluteal tears are the more common diagnoses that encompass GTPS, with approximately 2 patients per 1000 each year being affected.[3-5] Greater trochanteric pain syndrome is more prevalent in women than men with a 4:1 ratio, especially between the fourth and sixth decades of life.[1,3,6] Due to the complexity of the hip joint and surrounding anatomy, differential diagnosis of lateral hip pain can often be difficult, specifically between trochanteric bursitis and tendinosis.[1,2,6,7]

The hip is a ball and socket joint with 3 degrees of freedom.[8] The 4 muscle groups providing motion at the hip include gluteal, anterior, posterior, and medial. Greater trochanteric pain syndrome typically focuses on disorders of the gluteal region of the hip and the structures commonly affected are gluteus medius and minimus and the ITB.[8,9] Due to its shape and location, the gluteus medius muscle is often the most susceptible to injury.[6] It is a fan shaped muscle, with proximal attachment on the external surface of the ilium and a distal attachment on the lateral surface of the greater trochanter[8,9] but more specifically to the superior-posterior and the lateral facets of the greater trochanter.[5] The gluteus medius contributes to internal rotation and is the prime abductor of the hip, responsible for keeping the pelvis level during gait, running, and single leg activities.[4]

Other anatomical structures may also contribute to the lateral hip pain such as bursae, which are membranous, fluid filled sacs, located in areas between bony prominences and soft tissues to act as a gliding interface and provide cushioning during friction.[3-5,9] According to Woodley et al,[1] when referring to the trochanteric bursitis, there are thought to be 8 bursae that could be the origin of pain in the lateral hip. Of those 8, the most common bursae involved in trochanteric bursitis are the subgluteus medius, the subgluteus maximus (trochanteric), and the subgluteus minimus bursae.[10] The subgluteus maximus bursa is the largest and located superficially to the posterior facet of the greater trochanter and the lateral insertion of the gluteus medius tendon,[5,10] whereas the subgluteus medius bursa is located deep to the gluteus medius tendon, and the subgluteus minimus bursa is located over the anterior facet of the greater trochanter, deep to the gluteus minimus tendon.[10] Due to the close proximity of numerous anatomical structures, irritation of the bursae is common.

Trochanteric bursitis has been defined as inflammation of the bursa, which can be caused by repetitive action causing friction over the bursa or acute trauma to the surrounding muscles and tendons.[9] Trochanteric bursitis is the most common diagnosis for patients with complaints of lateral hip pain.[1,3,4,6] The common presentation of trochanteric bursitis is a dull, aching pain, with tenderness around the greater trochanter and radiation of pain along the lateral thigh.[1,5] Conservative treatment and corticosteroid injections have been shown to be effective in 90% of people diagnosed with trochanteric bursitis.[3] Unfortunately, the pain pattern and presentation of trochanteric bursitis is not unique, making it hard to differentiate between this and other disorders, especially tendinosis.

Tendons are comprised of 95% Type I collagen fibers and are responsible for distributing forces across joints, stabilizing joints, and aiding in body movement.[11] Tendinosis refers to a degeneration of the tendon's collagen over time.[11,12] Within the lateral hip, tendinosis and tears most commonly affect the gluteus medius. Over the last decade, research has shown an increasing number of cases of gluteal tendinosis and tears.[11] Due to common misdiagnoses and the umbrella term GTPS, it is unclear from the literature exactly what the incidence of gluteus medius tendinopathies may be. According to Woodley et al,[1] the prevalence of gluteal tendon pathology is variable, ranging from 25.7% to 83.3%, making it one of the most common causes of lateral hip pain and the most common of tendinopathies in the lower extremity.[5]

Tendinosis onset is often insidious, worsening over time; however, it can also occur following a fall or a forceful contraction.[6] Tendinosis and bursitis share the same common symptoms of pain and tenderness along the greater trochanter.[3,5,6,9] Tendinosis does not typically present with inflammation; therefore, cortisone injections are often unsuccessful.[5,6,11] The most common activity limitations associated with gluteal tendinosis are rising to stand or walking after sitting, sleeping on the involved side, single leg stance activities, and climbing stairs.[5] Patients often show increased weakness in abduction and may develop a Trendelenburg gait pattern.[5,6] Tendinosis could ultimately result in partial or even full-thickness tears if untreated or not detected soon enough, making conservative therapy an insufficient measure.[6,11,12]

Long and colleagues[10] performed a study with a sample size of 877 patients with GTPS. Of the sample size, 79.8% showed no evidence of bursitis on ultrasound and 49.9% had gluteal tendinosis. Of those with tendinosis, 26.9% had isolated gluteus medius tendinosis and 0.2% had partial thickness tears of the gluteus medius.[10] Literature has shown the increase of misdiagnoses between trochanteric bursitis and gluteal tendinosis results in an increased recovery time and prolonged duration of disability and pain.[1,2,4-7,10]

METHODS

To mitigate misdiagnoses of lateral hip pain, much research is being conducted to determine reliable clinical tests to best evaluate patients. Several tests have been used to differentially diagnose between bursitis and tendinosis that have shown to be both reliable and valid.[1,5,6]

Literature research has demonstrated that there are 5 valid and reliable clinical tests for differentiating causes of lateral hip pain. Those tests are single limb stance, hip lag sign, Ober's test, resisted abduction, and isometric hip abduction.[1,5,6] Each test aids in indicating slightly different diagnoses so it is important that each test be implemented during the initial evaluation of a patient with lateral hip pain. These tests can easily be completed in a relatively short time.

The tests should be in the order of easiest to most difficult for the patient to do:

1. Isometric hip abduction test (sensitivity: 80%, specificity: 71%).[6] This test is performed by having the patient start in the sidelying position. The patient is then asked to do isometric hip abduction without any external resistance applied by the examiner. If the patient has reduced abductor contraction and/or increased pain with the contraction, it is indicated as a positive test for gluteus medius tendinosis.[6]
2. Resisted abduction (sensitivity: 73%, specificity: 46%).[5] In this test the patient is asked to lay on the uninvolved side and the examiner brings the involved leg into abduction and slight extension. The examiner then applies moderate resistance against the involved leg. The test is considered positive if weakness is elicited and is indicative of GTPS, specifically tendon involvement.[5]
3. Ober's Test (sensitivity: 41%, specificity: 95%)[5] should be performed next. The patient should be in sidelying on the uninvolved side with the involved leg in 90° of knee flexion. The examiner then brings the leg into adduction and allows it to fall to end range. If there is restricted range and/or pain reproduction, it is considered a positive test, which is indicative of ITB tightness or trochanteric bursitis.[5,6]
4. The hip lag sign (sensitivity: 89%, specificity: 97%)[5] test is performed with the patient in sidelying on the uninvolved side and the examiner passively brings the involved leg into abduction, slight extension, and internal rotation. The patient is then asked to hold that position. If the patient's foot drops more than 10 cm or the patient is unable to hold the internally rotated position, it is considered a positive test. The hip lag sign is indicative of a gluteus medius tear.[5]
5. The single leg stance test (sensitivity: 23%, specificity 94%)[1] is where a patient is asked to stand on the involved leg for 30 seconds with minimal hand support of the examiner. If the patient is unable to lift the uninvolved leg off the ground or if the patient is unable to stand on the involved leg for at least 30 seconds, it is considered a positive test. A positive single leg stance test is indicative of tendinosis of the gluteus medius.[1,5,6]

Following the detailed patient history and completion of above clinical tests, it is the physical therapist's responsibility to determine if the patient should be referred for further diagnostic imaging or if additional testing is warranted. The two most reliable diagnostic imaging tests identified in the literature are ultrasonography and magnetic resonance imaging (MRI). The MRI is considered a gold standard for determining tendinosis and gluteal tears with an accuracy of 91%.[2,13] Ultrasonography is also considered a reliable test for determining gluteal tendon pathology with a sensitivity of 79% to 100%.[2,10]

The purpose of this case study was to determine the most appropriate and reliable clinical tests to perform during an evaluation of the hip region. This aids the physical therapists in more accurately discerning between trochanteric bursitis and gluteal tendinosis in a patient with lateral hip pain.

Patient Description

The patient was a 61-year-old Caucasian female with a two-year history of left lateral hip pain that began approximately two weeks after she slipped on the ice sustaining a fall on the outstretched hand. For her hand injury, she was referred to a hand therapist by her primary care physician. She recovered from the hand injury after several months of therapy. For her left hip pain two weeks following her fall, she consulted with an orthopedic surgeon who diagnosed her with left hip trochanteric bursitis and prescribed physical therapy for 4 weeks. The patient was compliant with 4 weeks of therapy but only displayed minimal pain reduction, which ultimately led to her discharge from physical therapy. At this point, her physician administered a cortisone injection that only slightly decreased her pain for approximately one week. She discontinued treatment following the cortisone injection and took ibuprofen on an as needed basis.

Eight months following the initial injury in August 2016, the patient reported an increase in pain in her left hip and returned to her physician for additional evaluation. The physician at that point ordered an MRI, which revealed left gluteus medius tendinosis with small partial thickness tearing at the greater trochanter and no evidence of trochanteric bursitis (Figure 1 and 2). Two months later the patient underwent an open repair of the left gluteus medius in November 2016 to reattach the gluteus medius tendon to the greater trochanter. Following the procedure, the patient was on strict nonweight bearing (NWB) precautions for 6 weeks. She came to physical therapy in December 2016 once she was no longer in the NWB status. The orthopedic surgeon provided a detailed protocol for the plan of care (Appendix).

A review of systems revealed that prior to her injury she was active and worked as a school nurse. Her family history was positive for cardiac disease. She was on medications to control her hypertension. Due to the postoperative restrictions of NWB status and no driving she was not engaged in any activities following her hip surgery. Her postoperative pain was being managed well with ibuprofen on an as needed basis.

Upon initial evaluation of the hip, the patient demonstrated 90° of active hip flexion and 20° of active hip abduction, before experiencing pain. Passive physiological movements were not performed due to protocol restrictions and internal and external rotation was not measured due to the patient reporting 7/10 pain level on the numeric pain rating scale.

A general strength screen was performed of the patient's bilateral upper extremities and right lower extremity (LE); all were within normal limits (WNL). The manual muscle testing of the left LE revealed: hip abduction 4-/5, hip flexion 4/5, knee flex-

Figure 1. Coronal view of superficial fibers of left gluteus medius showing tendinosis.

Figure 2. Coronal view of deep fibers of left gluteus medius detached from greater trochanter.

ion and extension 5/5, and 5/5 ankle dorsiflexion. The abnormalities included left Trendelenburg, decreased step length on the right, and decreased gait speed. A gross neurological screen was performed and reflexes and sensation were WNL. The integumentary examination revealed a well healed incision with no apparent redness, swelling, or warmth. With palpation by the examiner, the patient reported mild tenderness along the greater trochanter, along the incision and into the gluteus medius muscle. No palpable muscle tightness was noted at evaluation. The patient's functional limitations included ascending and descending stairs without assistance, walking greater than a quarter mile, squatting, and sit to stand transitions.

The outcome measures performed on January 12, 2017, included Timed Up and Go (TUG) (sensitivity: 31%, specificity: 74%[14]) and Five Times Sit to Stand (FTSTS) (sensitivity: 66%, specificity: 67%).[15] The patient scored 15.21 seconds (cut-off score: 14 seconds)[14] for the TUG and 14.9 seconds for the FTSTS (cut-off score: 15 seconds).[16] The Oswestry Disability Index (ODI), with the intraclass correlation coefficient of 0.94 on the interrater reliability,[17] was given to the patient at the time of the initial evaluation. She scored a 16/50 that translated to a 32% disability rating.

A plan of care was made for 4 to 6 weeks with 2 sessions per week. The goal of treatment was to increase abductor strength, increase range of motion, and decrease overall disability rating to get the patient back to full time work and activities of daily living.

Intervention

Due to the partial tearing of the patient's gluteus medius tendon, conservative therapy was not sufficient alone to correct the problem. The patient underwent an open repair of left gluteus medius to reattach the deep gluteus medius tendon fibers to the greater trochanter. Following surgery, the patient was required to wear an abduction hip brace for 6 weeks and remain toe touch weight bearing (Figure 3).

Following her surgery, the patient was seen two times a week for one hour sessions focusing on strengthening, starting with isometrics, and progressing to weight bearing. The protocol was broken into 4 phases: immediate rehabilitation (weeks 1-2), intermediate rehabilitation (weeks 3-8), advanced rehabilitation (weeks 9-12), and sport specific training (weeks 12+). The patient was also given a home exercise plan (HEP) to adhere to in accordance with the in-clinic program. The intermediate phase focused primarily on nonweight-bearing strengthening such as isometric gluteus sets, clam shells, adduction ball squeezes, and ankle pumps. During this phase, range of motion was a main focus as well and soft tissue massage to decrease remaining tightness of the surrounding musculature. As the patient met criteria for progression, the therapist added the weight-bearing closed chain exercises to include monster walks, side steps, lunges, squats, stair training, standing hip 4-way, step ups, and step downs. Research has shown that progressing from nonweight-bearing to weight-bearing strengthening exercises produces greater increases in strength and overall better outcomes.[5] After 6 weeks of treatment, the patient's visits were decreased to one time per week as the patient was demonstrating compliance with her HEP.

FINDINGS

The patient was re-evaluated after 4 weeks of treatment and the outcome measures were reassessed. The patient showed significant improvements in all outcome measures. At this time, the gait reassessment showed no Trendelenburg, an increased step length, and increased gait speed. Along with the ODI, the patient self-reported a decrease in pain and increased confidence with ambulation, ascending and descending stairs, and strength overall.

The patient was able to stand on the involved leg for greater than 30 seconds with no hip drop and had a negative hip lag sign. The patient scored a 4/5 for resisted abduction. The patient had no pain with isometric hip abduction testing during re-evaluation.

CLINICAL RELEVANCE

The purpose of this case study was to

Figure 3. The patient wearing an abduction hip brace that prohibits abduction following surgical repair of the gluteus medius.

determine the use of special clinical tests during an evaluation to aid physical therapists in differentially diagnosing between trochanteric bursitis and gluteal tendinosis. The 5 clinical tests that have shown the most validity include the single leg stance, the hip lag sign, Ober's test, resisted abduction, and isometric hip abduction.[1,5,6]

The patient in this case showed significant improvements in strength during her time in physical therapy postsurgery as opposed to her presurgical treatment sessions even though the content of both periods of therapy mirrored one another closely. The patient was highly motivated and had a strong support system that aided in keeping her compliant with her HEP. She showed an increased confidence, increased gait speed, increased single limb stance time on the involved leg, and significant improvements in the TUG and FTSTS times. With an overall increase in strength, TUG, and FTSTS, the patient showed an increase in her ODI scores as well as reports of an overall improved quality of life.

The 5 tests discussed in this study were not performed during the patient's preoperative physical therapy management. Thus, it is the assessment of the authors that as a result the patient was misdiagnosed and participated in physical therapy that most likely had limited effect. Although those tests were known, at the time of her original presentation in the physical therapy clinics, these tests had not yet been made a common practice in physical therapy. Grouping the 5 tests together in a more comprehensive sequence to rule in or rule out specific structures in the lateral hip region is more effective than just selecting single tests in isolation. Each test indicates a slightly different diagnosis; however, they can help to determine and narrow down the hip structure of concern.[1,5,6] With each of these tests being easy to administer,[5,6] it would be appropriate to add them to each hip initial evaluation as well as to the reassessment during each week of care. By working in a systematic way, these tests can further rule in or rule out pathologies in an effort to determine an accurate diagnosis and appropriate intervention.

As discussed in the outcomes and seen in Table 1, while the same intervention was used both pre- and postsurgery, the strengthening protocol was more effective following the correct initial intervention. With an accurate diagnoses a decrease in recovery and disability times for patients suffering with lateral hip pain can be expected. Thus, had these 5 tests been used at the initial evaluation of this patient, she likely would have been referred out in a timely manner to undergo a corrective surgical intervention.

Although much literature exists on various possible causes, further studies are recommended to ascertain the validity and reliability of the 5 clinical tests used in this case for the differential diagnosis of lateral hip pain. Hence, timely and accurate interventions to facilitate recovery and improved function.

CONCLUSION

The beneficial outcomes from the second (postoperative) period of physical therapy when applied under the correct diagnosis as compared to the lack of improvement seen while the patient was under an alternate diagnosis suggest that accurate testing, and not limiting testing to just one or two special tests, would have been a more effective way to determine an accurate diagnosis and would have ensured that the patient received the appropriate treatment.

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Table 1. Outcome Measures at Initial Evaluation and Re-evaluation

Outcome Measures	Falls Risk Cut Off Score	Initial Evaluation Scores	Re-evaluation Scores (after 4 weeks)	Change	Minimal Detectable Change
ODI[18]	Not reported	16/50 = 32% disability	9/50 = 18% disability	5 points = 14%	10%
TUG[14,19]	13.5-14 seconds	15.2 seconds	9.9 seconds	5.3 seconds	Not reported for this patient population
FTSTS[20]	12 seconds	14.9 seconds	8.5 seconds	6.4 seconds	2.5 seconds

Abbreviations: ODI, Oswestry Disability Index; TUG, Timed Up and Go; FTSTS, Five Times Sit to Stand

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Appendix. Arthroscopic Hip Surgery

Physical Therapy Protocol

The intent of this protocol is to provide guidelines for your patient's therapy progression. It is not intended to serve as a recipe for treatment. We request that the PT/PTA/ATC should use appropriate clinical decision making skills when progressing a patient forward.

Please contact office to obtain the operative reports from our office prior to the first post-op visit. Also please contact if there are any questions about the protocol or your patient's condition.

Please keep in mind common problems that may arise following hip arthroscopy: hip flexor tendonitis, adductor tendonitis, sciatica/piriformis syndrome, ilialupslips and rotations, low back pain from quadratus lumborum (QL) hypertonicity and segmental vertebral rotational lesions. If you encounter any of these problems please evaluate, assess, and treat as you feel appropriate, maintaining precautions and guidelines at all times. Gradual progression is essential to avoid flare-ups. If a flare-up occurs, back off with therapeutic exercises until it subsides.

Please reference the exercise progression sheet for timelines and use the following precautions during your treatments. Thank you for progressing all patients appropriately and please send all progress notes to office or hand deliver with the patient themselves. **Successful treatment requires a team approach, and the PT/PTA/ATC is a critical part of the team! Please contact at any time with your input on how to improve the therapy protocol.**

Please Use Appropriate Clinical Judgement During All Treatment Progressions

INITIAL PREOPERATIVE ASSESSMENT

Assess bilateral hips
ROM – flexion, extension, internal rotation, external rotation, abduction, adduction
Gait – look for Trendelenburg gait
Impingement test – flexion/adduction/internal rotation often reproduces pain
Ober's Test
Strength – abduction, flexion, extension

**** PLEASE SEE LAST PAGE FOR MODIFICATIONS – PATIENT SPECIFIC PROCEDURES****
Begin therapy Post-Operative Day (POD)#1
(unless otherwise instructed)

Phase 1 – Immediate Rehabilitation (1 to 2 weeks):
Goals:
Protection of the repaired tissue
Prevent muscular inhibition and gait abnormalities
Diminish pain and inflammation

Precautions:
20 lb. flat-foot-weight-bearing post-op, duration per medical doctor's orders depending on procedure
Do not push through pain or pinching, gentle stretching will gain more ROM
Gentle passive ROM only, **no passive stretching**
Avoid capsular mobilizations
Avoid any isolated contractions of iliopsoas

Initial Exercises

Active Assisted ROM: within range limitations, painfree
ROM guidelines (painfree)
Flexion: 90° x 3 weeks
Extension: 0° x 3 weeks
Abduction: 25°-30° x 3 weeks
Internal rotation: 90° hip flexion: 0° x 3 weeks; neutral (prone): within comfort zone
External rotation: 90° hip flexion: 30° x 3 weeks; neutral (prone): 20º x 3 weeks
After 3 weeks, gradually progress ROM as tolerated,* ***within painfree zone*

- Soft tissue massage (scar, anterior, lateral, medial and posterior aspects of hip, lumbar paraspinals, quad/hamstring)
- Stationary bike with no resistance
- Isometric (quad setting, gluteal setting, transverse abdominis isometrics with diaphragmatic breathing)
- Prone lying (modify if having low back pain) – AVOID in instability patients

Phase 2 – Intermediate Rehabilitation (3 to 8 weeks)

Criteria for progression to Phase 2:

Full Weight Bearing Must Be Achieved Prior To Progressing To Phase 2
Non weight bearing exercise progression may be allowed if patient is not progressed by medical doctor to full weight bearing (Please see last page for microfracture modifications)

Goals:

Protection of the repaired tissue
Restore full hip ROM – (ROM must come before strengthening)
Restore normal gait pattern
Progressive strengthening of hip, pelvis, and lower extremities
Emphasize gluteus medius strengthening (nonweight bearing)

Precautions:

No forced (aggressive) stretching of any muscles
No joint/capsular mobilizations – to avoid stress on repaired tissue
Avoid inflammation of hip flexor, adductor, abductor, or piriformis

Intermediate Exercises

Gentle strengthening; ROM must come before strengthening
- Stationary bike no resistance, add resistance at 5 to 6 weeks
- Hooklying progression: pelvic clock, transverse abdominis with bent knee small range external rotation, marching, add isometric with Kegel ball, isometric abduction with ring
- Prone progression: internal rotation/external rotation active ROM, prone on elbows with glut setting-press ups, hip extension, alternating arm/leg raise
- Sidelying progression: clams 30º hip flexion to 60° hip flexion, hip abduction straight leg raise, side plank on elbow
- 1/2 kneel: gentle pelvic tilt for gentle stretch of iliopsoas
- Bridge progression
- Balance progression: double leg to single leg balance
- Pelvic floor strengthening
- Elliptical/stair stepper: 6 to 8 weeks
- Step and squat progression
- Slide board: hip abduction/adduction, extension, internal rotation/external rotation. No forced abduction. Stop short of any painful barriers.
- **Continue to avoid any isolated contraction of iliopsoas**

Phase 3 – Advanced Rehabilitation (9 to 12 weeks)

Criteria for progression to Phase 3:

Full ROM
Painfree normal gait pattern
Hip flexor strength of 4/5
Hip abduction, adduction, extension, and internal rotation/external rotation strength of 4+/5

Goals:

Full restoration of muscular strength and endurance
Full restoration of patient's cardiovascular endurance
Emphasize gluteus medius strengthening in weight bearing

Precautions:

No contact activities
No forced (aggressive) stretching
No joint mobilizations – to avoid stress on repaired tissue

Exercises:

- No treadmill walking until 12 weeks
- 4-pt lumbar/core stabilization progression
- Anterior/side plank progression
- Crab/monster walk
- Lunges all directions
- Single leg squat
- **Continue progressions of exercises in phase 2.**

Phase 4 – Sport Specific Training > 12 weeks

Criteria for progression to sport specific training:

Hip Flexor strength 4+/5
Hip adduction, abduction, extension, internal rotation/external rotation 5-/5
Cardiovascular endurance equal to preinjury level
Demonstrate proper squat form and pelvic stability with initial agility drills, stable single-leg squat.
Return to sport activities as tolerated without pain, consistent with medical doctor orders.

Exercises:

- Customize strengthening and flexibility program based on patient's sport and/or work activities
- Z cuts, W cuts, Cariocas
- Agility drills
- Jogging
- Gradual return to sport