

Rehabilitation After Gluteus Medius and Minimus Treatment



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Abstract: We reviewed the current literature regarding rehabilitation after gluteus medius and minimus tears as part of a conservative management or postoperative protocol. The greater trochanteric pain syndrome includes a constellation of pathologies that generate pain in the greater trochanteric region and may be accompanied by varying degrees of hip abductor disfunction. It may be related to tendinitis of the gluteus medius and minimus, greater trochanteric bursitis, or even formal tears of the hip abductor tendons. The initial management strategy of the hip abductor tears is conservative, including different anti-inflammatory therapies such as physical therapy and cortisone and platelet-rich plasma injections. The clearest indication for surgical management is failure of conservative management and loss of abductor muscle power. Surgical management has been performed both open and endoscopic with good reported clinical results. More severe tears typically require a more rigid and complex type of fixation. Exercise intervention seem to improve symptoms after 4 months to a year of therapy therefore a very close supervision of the rehabilitation protocol is mandatory. Gluteus medius and minimus tears are frequent and may be not diagnosed timely. Treatment of these of lesions is based on the knowledge of pathomechanics involved and the extent of injury to the tendon and muscle tissue. Conservative management is based on protecting the hip abductor tendons from excessive tensile and compression stresses while applying progressive load in conjunction with physical and medical anti-inflammatory measures. Surgical treatment is indicated when conservative management fails or an abductor power deficit is associated with pain. Similar physical therapy protocols to those used in conservative management are used postoperatively. **Level of Evidence:** Level V, expert opinion.

Gluteus medius and minimus tears have been identified recently as an important source of lateral hip pain and in some cases gait problems that may be an important cause of disability. Tears of the gluteus medius and minimus are included in what is now recognized as the greater trochanteric pain syndrome (GTPS), which includes a constellation of pathology ranging from greater trochanteric bursitis, tightness of the iliotibial band, and tendinitis to formal

muscle and tendon tears of the hip abductors.¹ GTPS affects between 10% and 25% of the general population, with a peak incidence between the fourth and sixth decades of life.² In a multicenter observational study, Segal et al.³ found that the prevalence of GTPS was 15% for unilateral disease and 8.5% for bilateral disease in women and 6.6% for unilateral disease and 1.9% for bilateral disease in men. The clearest indication for surgical treatment of gluteus medius and or minimus tears seems to be loss of abductor power (Medical Research Council Grading of Power) less than 4⁴ and Trendelenburg gait.⁵

Gluteus medius and/or gluteus minimus tendinopathy is now accepted as the most prevalent pathology in those with pain and tenderness over the greater trochanter.⁶

Understanding the pathomechanics of these conditions is mandatory to understand the principals for physical therapy for both conservative management and therapy after surgical treatment. We reviewed current literature regarding rehabilitation after gluteus medius and minimus tears as part of a conservative management or postoperative protocol.

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Pathomechanics of Gluteal Medius and Minimus Tendon Pathology

Mechanical loading is a strong driver of the biological processes that occur within a tendon and these, in turn, determine its structural shape and load-bearing capacity. A tendon can undergo both catabolic and anabolic processes. Under conditions of normal loading, these processes are balanced and provide the basis for a healthy homeostatic state within the tissue. This balance can be altered by the type, intensity, and frequency of loading.⁷ Tendon loads can be longitudinal (tension or traction loads) or perpendicular (compression) to its collagen fibers. Tensile loads can be applied actively via muscle contraction or passively via stretching. Tendon loads will be greater when the muscle is active and the tendon lengthens at the same time, that is, with eccentric contractions, where anatomical compression may also occur.⁸

The pathomechanics associated with the development of gluteal tendinopathy are like those proposed for other insertional tendinopathies: relatively increased tensile load (overload)⁹ or decreased (protection against stress/load). The combination of traction and compression overload appears to be particularly damaging.¹⁰ Gradual increases in tensile load with adequate adaptation and recovery time induce a net anabolic effect, with a subsequent increase in tendon load capacity.⁷ A rapid increase in the intensity and/or frequency of the tensile load can lead to failure of adaptation and a net catabolic effect. Net catabolism also results from a lack of tensile and compressive loading. At the cellular level, stress deprivation and compression induce the expression of catabolic enzymes, which degrade type I collagen¹¹ and increase the expression of large proteoglycans in tenocytes, which cleave collagen fibers.¹² This matrix degradation and changes in tenocyte expression reduce load-bearing capacity and predispose to injuries with relatively low tensile loads.¹⁰ The interaction between bone and muscle factors must be considered to understand how compressive load or protection against stress contributes to the underlying pathomechanics of this disorder.¹³

The tendons of gluteus medius and gluteus minimus, can be compressed by the iliotibial band at its insertion into the greater trochanter. Compressive load is influenced by the position of the hip joint. Compressive loads in this region of 4 Newtons (N) at 0° hip adduction have been shown to rise to 36 N at 10° adduction and 106 N at 40° adduction.¹⁴ During activities with excessive hip adduction, compressive loads are likely to accumulate on the tendons, both in static postures and in dynamic tasks.¹⁵ It is likely that during activities such as standing with one hip adducted, sitting with the knees together or crossed in

adduction, an excessive tilt or lateral displacement of the pelvis during dynamic single-leg loading tasks, and running in a pattern gait with foot–ground contact with excessive hip adduction, compressive loads accumulate on the tendons.

Greater ranges of hip flexion also can alter iliotibial band tension due to the significant fascial confluence of the iliotibial band with the gluteal fascia and lumbo-dorsal fascia,¹⁶ thus potentially contributing to compression of the gluteus medius and gluteus minimus tendons. The combination of greater ranges of hip flexion and adduction is likely to induce a substantial compressive loading on the gluteus medius tendon.

The abductor mechanism of the hip involves 2 muscle group synergies, the first of which is the trochanteric abductor muscles consisting of the gluteus medius and minimus and, second, the tensor fascia lata and the gluteus maximus in conjunction with the vastus lateralis that provide tension to the iliotibial band.¹⁵ The trochanteric abductors provide 70% of the abductor force required for pelvic control in a single leg stance, with the remaining 30% provided by the iliotibial band tensing muscles.¹⁷ The tensor fascia lata has been shown to hypertrophy and the gluteus medius and minimus to atrophy in those patients with gluteal tendon pathology.^{18,19} The imbalance in the activity of the trochanteric abductors and iliotibial band tensors could alter the relative contribution of these muscle groups in the control of movement or postures in the frontal plane.¹⁶

Bone morphology also influences the compression forces exerted on the hip by the iliotibial band. At a femoral neck–shaft angle of 128°, the iliotibial band exerts a compression force of around 656 N on the greater trochanter, but at 115°, the compressive force increases up to 997 N.^{14,15}

The gluteus medius in women has been found to have a smaller insertion on the femur across which to dissipate the tensile load and a shorter moment arm, resulting in reduced mechanical efficiency. This mechanical disadvantage is further accentuated in those with a smaller femoral neck–shaft angle, which may lead to greater tensile loads in female gluteal tendons.²⁰ Women who have a less efficient gluteus medius more often use greater adduction during functional activities to provide a mechanical advantage to their abductors. Hip abductors have been shown to generate the greatest forces from a hip adducted position, probably associated with length–tension relationships.²¹ In addition, pretensioning the iliotibial band in adduction provides an advantage for the superficial abductor system, exerting its force through the iliotibial band. These strategies can reduce the tensile load and increase the compressive load in the deeper regions of the gluteus medius and minimus tendons.

Conservative Treatment of Gluteus Medius and Minimus Pathology

Initial treatment of abductor tendon pathology is conservative and may include short-term use of nonsteroidal anti-inflammatory drugs, activity modification, physical therapy, local injections of corticosteroid or platelet-rich plasma (PRP), and shock wave therapy. If conservative treatment fails to alleviate symptoms, surgical treatment can be attempted. However, the limited availability of high-quality studies and elusive evidence between tendinosis and partial tears cannot provide definitive conclusions regarding the best treatment of gluteal tendinopathy. Randomized controlled trials are needed to test the proposed treatment modalities.^{22,23}

Cortisone is one of the most commonly prescribed treatment methods for gluteal tendinopathy.^{24,25} Cortisone infiltration of the peritrochanteric region, both blind and guided by ultrasound, has been used. However, most studies are case series without controls and studies with sufficient statistical power are scarce. In addition, abductor tendon pathology is rarely confirmed by magnetic resonance imaging. Corticosteroid injection generally provides immediate substantial pain relief within the first month; however, pain is not completely relieved, with a positive response in less than one-half of patients at mid- to long term.²⁶ In different series, corticosteroid injection provided moderate pain relief at 4 weeks in 72% to 75% of patients, decreasing to 41% to 55% at 3 to 4 months²⁵⁻²⁷ and at 12 months, there was no difference in outcomes between the groups receiving corticosteroid injection and those receiving usual care (pain relievers as needed).²⁸ One of the drawbacks of corticosteroid injections is the unknown mechanism of action and safety with respect to repeated use. The main mode of action is probably as a local analgesic and not as an anti-inflammatory, interacting with local neuropeptides and neurotransmitters. Recurrence of pain after injection generally reflects the inability of corticosteroids to address the underlying pathology.²³

Data on the use of PRP to treat gluteal tendinopathy is limited. Mautner et al.²⁹ Performed ultrasound-guided PRP injections in 16 patients with chronic gluteus medius tendinopathy. They reported 82% moderate-to-complete lateral thigh pain resolution at 6 months. In a case series study, ultrasound-guided PRP injections in 21 patients with tendinosis or partial tendon rupture without atrophy improved symptoms and functionality at a mean of 20 months of follow-up.³⁰ In a randomized clinical trial comparing ultrasound-guided triamcinolone and PRP in 20 patients with major trochanteric pain syndrome, triamcinolone had better initial results but was not superior to PRP at 2 months.³¹ In a prospective randomized control trial investigating only

partial tears, ultrasound-guided injection of PRP was superior to cortisone in 70 patients at 12 weeks using the modified Harris Hip Score scale.³²

Radial shock wave therapy is an alternative treatment modality for gluteal tendinopathy. Shock waves can penetrate soft tissues up to 4 cm, providing both analgesia and healing of the abductor tendons.³³ The benefit of shock wave therapy in the mid- and long term for gluteal tendinopathy has been reported in the literature. A study published by Rompe et al.,²⁵ in 2009 reported that at 4 weeks only 13% of the participants reported an improvement, which increased to 68% at 4 months and 74% at 15 months. An additional study by the same group compared the shock wave with several other traditional nonsurgical measures that were not described. The results of this study suggested that a single shock wave therapy treatment would be more effective than other conservative measures at a 12-month follow-up.³⁴

Postural Hygiene and Exercise

Postural Hygiene

Minimizing positions or activities that involve sustained or repetitive compression of the hip abductor tendons tendon has shown to help improve symptomatology, especially when compressive forces are applied in combination with high tensile loads.^{8,9} It is recommended to avoid hip adduction positions, standing cross-legged, and sitting with the knees crossed or together¹⁵ (Fig 1).

Decubitus postures: In side-lying, the gluteal tendons on both sides are compressed: the lower side against the bed and the upper side due to the position of the hip in adduction (Fig 2). Alternative or modified positions would include lying supine with a pillow under the knees if necessary (to unload the anterolateral hips and lumbar spine). Some patients also can obtain relief in a position that is one-quarter of the prone position, in which the body weight rests on the anterolateral thigh (eliminating the compressive load of the greater trochanter), with the hip higher in relative abduction.¹⁵

Stretching of the hip adductors, flexors, or extensors combines strong passive tensile loads and compressive loads and should therefore be avoided. Massage and puncture techniques can be used instead of stretching, although strong "iliotibial band releases" can be challenging, as the iliotibial band is often sensitive.³ Movement patterns employed during functional weight-bearing tasks and deficiencies observed and used to direct treatment should be assessed.¹⁵

Controlling high tensile loads, particularly rapid increases in activities that involve an additional stretch-shortening or compression cycle, may be critical for



Figure 1. Clinical photographs: Standing, top left, demonstrates a relaxing position of the iliotibial band. Top center, leg-crossing increases tension on the iliotibial band. Sitting, top right, this position will relax the iliotibial band. Bottom right, leg-crossing sitting, this will increase pressure on the iliotibial band. Bottom left, supine stretching of the iliotibial band.

optimal results in people with tendon pain. Patient education regarding avoiding potentially aggravating activities and careful titration of exercise volume are key components of a load management strategy.¹⁵

Recreational or sporting activity can generally be maintained if the more challenging aspects of those activities are avoided or minimized. Managing the load during activity for the elderly or physically unconditioned patient may involve minimizing climbing hills and stairs and titrating walking distance as necessary to control symptoms. For the athlete, the temporary suspension of long-distance running, tempo running, hill running, and plyometrics may be necessary. Alternative activities such as aquatic exercise and cycling could be explored. As pain subsides and depending on the physical conditioning and occupational and sporting requirements of the patient, hip adduction control can be retrained under higher loads, at faster speeds, and during more complex actions such as running, land and change direction.¹⁵

Exercise

The implementation of an early and gradually progressive tensile loading program (in minimally adducted hip positions) aims to reduce pain and improve tendon capacity.⁸ In addition, strengthening exercises along with specific exercises in functional movements, at graded levels of difficulty appropriate to the individual, are likely to be key to rehabilitation.

Isometric Exercises

Sustained isometric muscle contractions are commonly used clinically for the management of tendon pain due to their analgesic effects.^{8,35,36} Low-intensity sustained contractions (25% maximal voluntary isometric contraction) are more effective in raising pain thresholds than high intensity (80%) in the normal population.³⁷

The optimal isometric loading dose is yet to be determined for tendon pain and may vary with the characteristics of the patient and with the particular

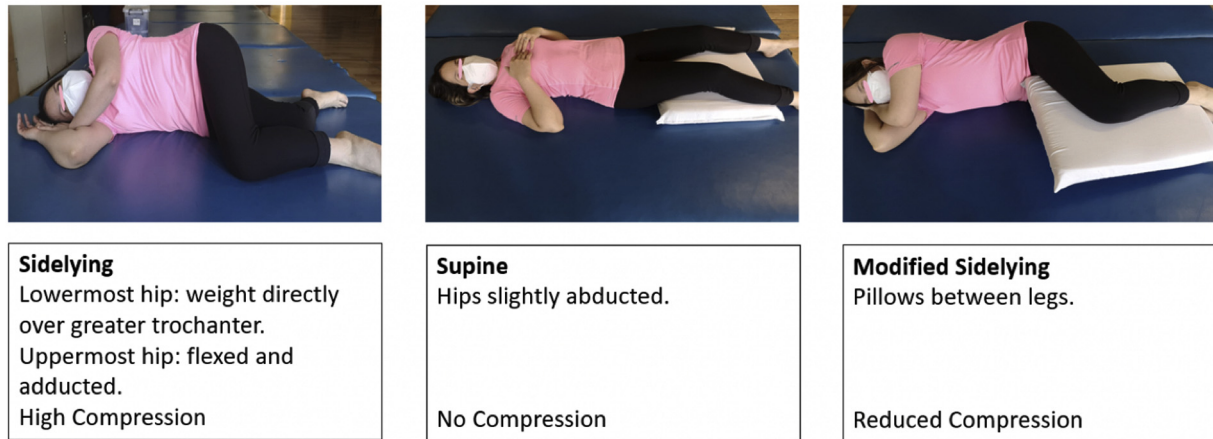


Figure 2. This photographs demonstrate positions of high and low compression of the iliotibial band supine and sidelying.

tendon and its anatomical relationships. A low-intensity effort focused on recruitment of the trochanteric abductor and thus loading these tendons in a painless manner is recommended for patients with painful gluteal tendinopathy.¹⁵ Greater isometric loads, with at least slight hip abduction to avoid compression, may be possible once the patient's response is carefully evaluated.

A recently published systematic review studied gluteus medius and minimus activity levels measured with surface electromyography using the percentage of maximal isometric voluntary contraction. Through this review, a group of exercises could be classified according to the percentage of isometric activity generated in the abductor muscles³⁸ (Table 1).

Low-load, low-velocity isometric hip abduction may be performed on the side, with the affected side up, and pillows are used to keep the hip in a neutral position or slightly abducted to avoid compression of the tendon. For bilateral conditions, a slightly abducted supine position can be substituted with a belt or elastic band around the distal thighs for slight resistance. Low-load isometric abduction also may be performed standing with slight abduction and even leaning with the back against a wall or hands on a bench in front, if the patient cannot achieve relaxation of the iliotibial band tensors in an initial position. It is suggested to instruct the patient to slowly increase the intensity of the contraction and to minimize pain in the early stages, until the therapist and the patient have determined how reactive the tendon is¹⁵ (Fig 3).

To achieve muscle hypertrophy of the gluteus medius and minimus, and to improve the tensile load-bearing of the gluteal tendons, a higher-level tensile loading is required. Low velocity, high-tensile load exercise, typical of muscle hypertrophy programs, has also been shown to produce beneficial effects on tendon structure that are not provided by exclusively eccentric programs.³⁹ Targeted strengthening of the trochanteric

abductors is perhaps best achieved in people with lateral hip pain by low-velocity, high-tensile load abduction, which minimizes tendon compression.¹⁵

High-tensile load-bearing exercise should only be performed 3 times per week, allowing adequate time for soft tissue recovery and adaptation.⁷ To achieve muscle hypertrophy, the patient must work at an adequate intensity, although there is considerable potential for exacerbation of pain and even rupture of a weakened degenerative tendon if the traction load is initiated at an excessive level or the load progresses too rapidly. It is safest to start with a moderate level of effort and few repetitions until the tendon response to the tensile load is established. For gluteal tendinopathy, the change in nighttime pain is often a good indicator of response to the exercise program. Once each level of tensile load is well tolerated, the load should be slowly increased and the response monitored to maximize structural change in the musculotendinous unit, while avoiding or minimizing exacerbation of pain.¹⁵

Management of associated modifiable risk factors and comorbidities is often a feature of gluteal tendinopathy rehabilitation. Although bone morphology cannot be modified, interventions may be necessary to improve lumbar spine, hip, and knee function to optimize control of hip and pelvic motion and thus the loading environment of the gluteal tendons.¹⁵ Coexisting degenerative joint disease of the lumbar spine, hip, and knee can result in associated weakness of the hip and knee extensors.^{3,40,41} Functional exercises, such as bridge, squat, and step exercises, can serve multiple purposes to optimize control of functional hip adduction, improve function of the lower-extremity extensors, and improve muscle support in the lumbopelvic region, hip and knee. Manual therapy and other specific exercises for the lumbar spine, hip, or knee joint may be required to address coexisting joint disease, but it is important that the principles of respecting gluteal tendon loading, particularly the gluteal tendon, are

Table 1. Segmental Mean Gluteus Medius Activity Levels (% MVIC) for Exercises

Exercise Category	Exercise	Muscle Segment (Middle Unless Indicated)	Low (0%-20% MVIC)	Moderate (21%-40% MVIC)	High (41%-60% MVIC)	Very High (>60% MVIC)
Side lie	Hip abduction	Anterior	13%-17%	29%-37%	42%-45%	79-100R
	Hip abduction + ER	Middle	13%-21%	23%-37%	41%-53%	62%
	Hip abduction + IR	Posterior	3%	33%-36%	45%-49%	
	Hip abduction + Ext		13%-18%	31%	47%	
	Clam hip flex 0°			27%-40%		
	Clam hip flex 30°			27%-36%		
	Clam hip flex 45°			23%		
Squat	Single leg squat	Anterior	18%	24%-37%	41%-60%	90%
	Single leg squat + ER	Middle	19%	27%	42%-46%	60%-92%
	Single leg squat + Abd	Posterior	13%	33%	42%	87%
	Single leg squat + Add	Anterior	16%	31%	52%	
	Single leg wall squat	Middle	9%-12%	22%	44%	
	Single leg wall squat + Abd	Posterior	9%-10%	22%-32%	47%-52%	
	Single leg wall squat + Abd	Anterior		35%	59%	
	Single leg wall squat + Add	Middle		29%		
	Single leg wall squat	Posterior		33%		
	Wall squat	Anterior		21%		
	Squat + Abd	Middle		28%		
	Squat + Add	Posterior		21%-33%		
		Anterior		24%		
		Middle				
Step	Lateral step-up	Posterior				
	Lateral step-up + IR	Middle	17%	38%-39%	60%	63%
	Lateral step-up + ER	Posterior	14%-17%	30%	41%	74%
	Lateral step-down			19%-25%	40-50R	62%
	Lateral step			24-40R	44-58R	
	Lateral step			19-36R	44-55R	
	Lateral step + IR			27-48R		
	Lateral step + ER			29%-30%		
	Forward step-up			19%-28%		
	Forward step-down			37%		
Lunge	Retro step-up					
	Forward lunge	Anterior	8%-25%	29%	45R	71R
	Transverse lunge	Middle	13%	28R	42%	68%
	Sideways lunge	Posterior		39%	48%	
Standing	Hip hitch/pelvic drop	Anterior		21%-25%	42%-58%	69%-80%
	Hip abduction	Middle		23%-38%	56%	66%-88%
	Hip abduction (moving limb)	Posterior		22%-38%	42-50R	74%-88%
		Anterior		30%	41%	
		Middle		28%-33%	53R	
Supine		Posterior				
	Single leg bridge	11%-17%	20%-28%	31%-35%	40%-58%	
	Double leg bridge					

ER, external rotation; IR, internal rotation; MVIC, maximal isometric voluntary contraction.

preserved. compression control. Exercise and general increases in activity also can reduce weight.¹⁵

Evidence-Based Exercise

A study examined the effect of an exercise intervention for patients with pain and tenderness on the greater trochanter and positive results in clinical test.

This nonrandomized trial compared exercise at home with shock-wave therapy and corticosteroid injection. In the short term, the exercise intervention was ineffective, as only 7% of the participants reported an improvement at 4 weeks. However, positive results increased to 40% at 4 months and 80% at 15 months. The exercise program included piriformis and iliotibial

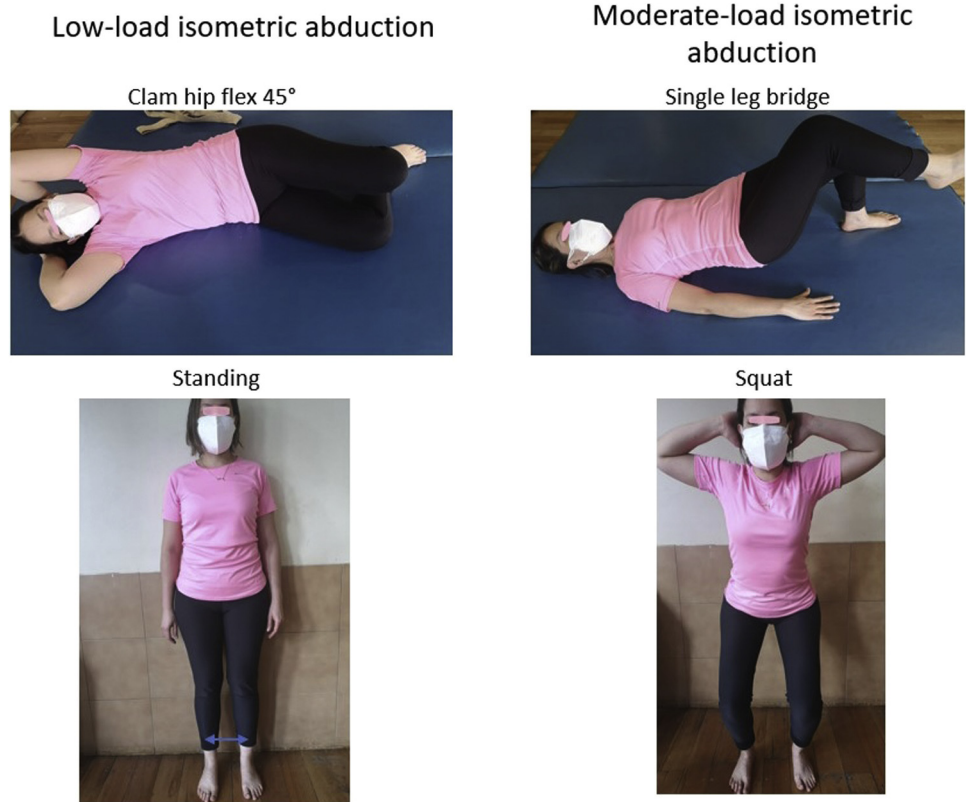


Figure 3. Hip abductor exercises for the management of gluteal tendinopathy.

band stretches, potentially exposing the gluteal tendons to compression, strengthening with straight leg raises, wall squats, and prone hip extension, but muscle strengthening of hip abductors was not included.²⁵

A prospective, randomized, single-blind, 3-arm clinical trial compared education plus exercise versus the use of corticosteroid injections versus a wait-and-see approach to pain and overall improvement in gluteal tendinopathy. At 52 weeks, the 78.6% success rate for overall improvement for education plus exercise was better than the 58.3% success rate for the use of corticosteroid injections (risk difference 20.4%; 95% confidence interval 4.9%-35.9%) and better than the 51.9% success rate for the wait and see approach (26.8%; 95% confidence interval 11.3%-42.3%). In contrast to the study by Rompe et al.,²⁵ in this study of greater methodologic quality, the benefit of education plus exercise over the injection of corticosteroids was greater in all short-term primary outcomes (8 weeks). This greater rate could be due to the fact that the study focused on the principles of tendon load management and specifically focused on the function of the gluteus medius and minimus muscles with the prescribed exercise program. Exercises at home in the previous study included exercises that did not specifically target these muscles, or control the degree of tendon loading (especially compression loading) for the gluteal

musculotendinous complex, and involved limited exercise supervision.⁴²

Postoperative Rehabilitation Protocol

In the case of postoperative rehabilitation protocols, it is of the utmost importance to know the surgical approach, surgical findings, and repair techniques for gluteal medius and/or minimus muscle tears. The rehabilitation protocol will then be adjusted accordingly to offer the greatest benefit and optimize the patient's function and quality of life. The most important considerations are the restriction of mobility and weight bearing, the use of bracing to limit abduction or not, and the allowed ambulation and strengthening exercises.

The Milwaukee Classification of hip abductor tears is a 4-tier system based on the hours on a clock-face. For a right hip the clock hours are assigned from 11 to 3 o'clock and for a left hip the hours are assigned from 9 to 1 o'clock. Tears will begin at the central fibers of the gluteus medius tendon which corresponds to 1 o'clock in a right hip or 11 o'clock on a left hip. The tears typically extend inferiorly and posteriorly with the grade increasing as the tear progresses. Grade I tears will include the surface extension of one hour in the clock-face, grade II tears will include the surface

extension of 2 hours, grade III 3 hours, and grade IV almost a complete detachment.⁴³

Davies and Davies⁴³ reported that there was no statistically significant difference in the results of open surgical technique in 23 open repairs regardless of the type of tear. The majority of the patients were satisfied with the surgical outcome. The mechanical strength of the repair was increased in this series according to the type of rupture. For grade I and II tears, it was sufficient to use 6.5-mm anchors with number 2 sutures, whereas for Grade III and IV bone tunnels and number 5 sutures were necessary. Davies and Davies⁴³ suggest that the patients begin with 25% weight-bearing for the first 6 weeks when the tear was grade I, 8 weeks for grade II, 10 weeks for grade III and 12 weeks for grade IV.

For an open repair of an acute traumatic tear of gluteus medius and minimus tendons, Stanton et al.⁴⁴ decided to restrict the weight-bearing for 12 weeks, with gradual progression. The hip flexion was limited to 90° for the first 6 weeks and the hip abduction or passive hip internal rotation was allowed after 8 weeks.

For endoscopic management of gluteus medius tendon tears, according to Thauat et al.,⁴⁵ active rehabilitation should be avoided for the first 6 weeks. This consists of avoiding the active lateral rotation and adduction but allowing up to 90° of hip flexion for the first 3 weeks. An abduction brace should be worn during this period. At 6 weeks, weight-bearing and active lateral rotation and abduction are progressively resumed.⁴⁹

Kocaoglu et al.⁴⁶ and Saltzman et al.⁴⁷ standardized a 3-phase protocol. Phase 1 (0-6 weeks) avoided weight-bearing and promoted a gentle passive range of motion and full-time bracing to limit abduction. For Phase 2 (6-12 weeks), the patients progressed to weight-bearing, the brace was discontinued, and hip-strengthening exercise was initiated. For Phase 3 (>12 weeks), patients progressed to ambulation without assistance and return to general activity.

Discussion

GTPS is a very common clinical condition that may affect up to 25% of the general population and is far more prevalent in women.² This condition may range from tendinitis or bursitis to a tear of the gluteus medius and/or minimus tendons.^{1,3} Interest in the diagnosis and management of gluteus medius and minimus tears has increased recently. Management of these tears has been described as both conservative and operative, with the clearest indication for surgical treatment being loss of abductor power and failure of conservative therapy.⁵ Either way, rehabilitation is a very important aspect of the comprehensive management of gluteus medius and minimus tears. Postural hygiene is an important part of rehabilitation management of hip abductor tears; one

must minimize positions or activities that involve sustained or repetitive compression of the hip abductor tendons in combination with high tensile loads. It is recommended to avoid hip adduction positions, standing cross-legged, and sitting with the knees crossed or together.^{8,9,15} Abductor hip exercises may not produce early improvement of symptoms but have shown to improve pain and strength at 4 to 12 months after establishing the treatment protocol, this results in the necessity of adequate and close supervision of the patients who undergo physical therapy for hip abductor tears.²⁵ The same may be true for exercise protocols after gluteus medius and minimus surgical repair.⁴⁵⁻⁴⁷ In the case of postoperative rehabilitation management, the severity of the lesion on the abductor tendons seems not to be related with the clinical outcome but does determine the strength of the mechanical fixation required to fix the tears. Larger and more complex tears require more solid and stronger fixation.⁴³

Limitations

There is limited information in the literature regarding rehabilitation management of gluteus medius and minimus tears. Most of the available information comes from Level III and IV studies reporting on results of case series. This is not a systematic review of the literature but only an analysis of available information and an expert opinion.

Conclusions

Gluteus medius and minimus tears are frequent and may be not diagnosed timely. Treatment of these of lesions is based on the knowledge of the pathomechanics involved and the extent of the injury to the tendon and muscle tissue. Conservative treatment is based on avoiding postures that may produce tension or compression over the hip abductor tendons while gradually implementing progressive tensile load paired with anti-inflammatory physical therapy. Injections with corticosteroids and PRP or shock-wave therapy may complement physical therapy but should not be considered a standalone form of treatment. In general, failure of conservative treatment and pain associated with abductor power deficit are indications for surgical treatment. There seems to be no difference in the outcome between open or endoscopic management of hip abductor tendon tears and the rigidity of the fixation of the tears depend on the extent of the tear itself. Postoperative physical therapy is similar to that used for conservative management.

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