INTERMEDIATE EXERCISES FOR THE GLUTEALS (LOW TENSOR FASCIA LATAE)
PRACTITIONER NOTES

These Evidence for Exercise™ practitioner notes provide you with specific guidelines to prescribe intermediate exercises to strengthen the gluteal musculature while minimising activation of the tensor fascia latae.

What to prescribe them for

- Overactive tensor fascia latae

Excessive activation of the tensor fascia latae during exercises may be detrimental in patients with excessive hip internal rotation.[1] The tensor fascia latae is both a hip abductor and internal rotator. It can also exert a lateral force on the patella through its connections with the iliotibial band.[4-6] A small study found that "patients with abductor tendon tears showed hypertrophy of the tensor fascia latae muscle when compared to the contralateral healthy side and to patients without a tear."[7]

- Hip pain

Tears of the gluteus medius and minimis have been associated with hip pain[8] although evidence relating to hip abduction exercises and hip pain reduction are lacking.

- Degenerative hip joint pathology

Atrophy of the gluteus maximus relative to the tensor fascia latae has been observed in patients with advanced degenerative hip joint pathology.[1,9] These patients also demonstrate increased gluteus medius activation during stepping activities which is considered a compensation for weakness.[10] Interestingly, in the early stages of hip joint pathology hypertrophy of the hip abductor muscles may be present and this should be considered when prescribing gluteal exercises.[11]

- Lower back pain

Gluteus medius weakness and gluteal muscle tenderness are common symptoms in people with chronic non-specific lower back pain.[12-14] There is some association between gluteus medius and maximus weakness and lower back pain.[15-19] While limited information regarding the effectiveness of hip strengthening exercises for lower back pain exists there is some indication they may be beneficial.[20]

- Sacroiliac joint pain

Shear in the sacroiliac joint according to one model is prevented by two factors:

1. Form closure – joint anatomical features that increase the friction coefficient[21-23]

2. Force closure - Tension of muscles and ligaments crossing the joint that lead to higher friction and therefore stiffness[22,24]

Muscles that could increase force closure include gluteus maximus and biceps femoris[25-27] (due to their attachments to the sacrotuberous ligament), latissimus dorsi[28] (due to its partial coupling with gluteus maximus by the posterior layer of the thoracolumbar fascia, creating a compressive force acting perpendicular to the sacroiliac joint) and the erector spinae[29] (which are closely linked to the sacrum and posterior superficial sacroiliac ligaments).

The erector spinae, biceps femoris and gluteus maximus muscles have been shown to have a significant effect on sacroiliac joint stiffness.[22] Both the sacroiliac joint[30-33] and the long dorsal sacroiliac joint[34-38] can be significant pain generators in those with pelvic girdle pain. Patients with sacroiliac joint pain have been shown to display a delayed onset of gluteus maximus on the stance leg during standing hip flexion compared with healthy subjects.[39] Due to a lack of investigation it is unclear if exercises for the gluteals improve sacroiliac joint pain.

- Groin pain

Athletes with groin pain are more likely to display enlarged tensor fascia latae on sonography.[2]

- Patellofemoral pain syndrome

Patellofemoral pain syndrome has been associated with weak hip abduction and external rotation,[40-42] excessive internal rotation of the hip and lateral patella displacement[43-45] while general knee pathology has been associated with hip dysfunction that has ensued from gluteal weakness.[46] Alignment of the thigh and leg in the frontal plane can be heavily influenced by hip-abductor muscle weakness particularly during daily activities such as climbing/descending stairs, sitting or squatting.[47] Hip abduction strength exercises have demonstrated favourable outcomes for patellofemoral pain syndrome.[48-52]

- Anterior cruciate ligament injury prevention

Increased attention has been given to neuromuscular exercise focused at the hip for anterior cruciate ligament ruptures.[43,53] Poor hip strength and neuromuscular control has been associated with dynamic lower extremity valgus.[54,55] In female athletes, future anterior cruciate ligament injury risk is significantly correlated with high knee abduction moments.[54,56] This is reflected in the higher incidence of both anterior cruciate ligament ruptures in females who tend towards greater valgus alignment during landing and pivoting compared with men.[57-69]

- Iliotibial band syndrome

Iliotibial band syndrome has been associated with greater hip adduction and knee internal rotation[70-72] as well as hip abductor weakness.[73] Hip abduction strength exercises have been recommended for these patients.[74,75]

- Chronic ankle instability

Those with chronic ankle instability show a decreased onset latency of gluteus medius.[76] It is thought that weak hip abduction may limit the amount of time available to initiate the hip strategy required to counteract a sudden lateral external perturbation.[77]

- Improving athletic performance
- Lower limb injury prevention

Both the gluteus medius and maximus assist in load transference through the hip joint[78] providing local structural stability and contributing to alignment of the knee and hip joints.[79] The gluteal muscles can enhance athletic performance[40,80,81] and contribute to the prevention or rehabilitation of lower extremity injuries.[82-86]

How to prescribe them

These exercises can be prescribed in a 20-minute, one-on-one consultation. Following the consultation they can be incorporated into a group session or performed as home exercises. Follow-up consultations are recommended to assess technique and outcomes. For optimal results they should be performed for a minimum of four to six weeks and ideally incorporated into a long-term daily routine.

What the patient can expect

This series of exercises progresses from beginner exercises for the hip. Patients should continue to experience improvement in their condition be it hip, pelvic, lower back or knee pain. They should gain further confidence in their daily activities and notice increases in strength.

It should be noted that this exercise prescription draws from one study that compared multiple exercises to ascertain those that provided the most favourable activation of the gluteal muscles while minimising the activity of tensor fascia latae.[87] The results indicated that clams with elastic band, single leg supine bridge, donkey kick (bent leg), donkey kick (straight leg) and monster walk produce greater than 50% higher normalised electromyographic amplitudes for gluteus medius and maximus compared to tensor fascia latae, whereas outer thigh exercise, supine bridge exercise, hip hike, lunge, squat and step-up step-down did not.

CLAMS WITH ELASTIC BAND

Teaching points

Many patients contract their quadriceps resulting in hip flexion.*[88] Explain that the leg is to turn outwards and that it is the muscles of the buttock that do this. Have the patient palpate their gluteal muscles to identify the contraction.

If you wish to emphasise stability of the femoral head in the acetabulum you can ask the patient to 'suck your leg bone into its socket' before commencing the movement.

A small study indicated that the degree of hip flexion (30°,45° or 60°) during clams did not significantly alter the predominance of gluteus medius activation over tensor fascia latae activation. The authors speculated that "Proper technique (e.g. no spine 'twisting' or rotation at the pelvis to initiate the movement) is likely a more substantial consideration when prescribing and performing these exercises."[89]

*In their study in runners McBeth et al.[88] found the anterior hip flexors were more active then the gluteus medius during clams. They questioned the relevance of the exercise for strengthening hip abductors and external rotators while others support its use.[1] It could be suggested that the patient perform clams in a more extended hip position if the quadriceps seems to dominate the movement.

Key teaching phrases

"You should not feel the muscles in the front of your leg working – if so you may be lifting your leg forwards."

Contraindications

- Neck pain in this position
- Excessive back or hip pain during this exercise
- Excessive trochanteric tenderness of the hip on the floor

Evidence

This exercise preferentially activates the gluteus medius and maximus while limiting recruitment of the tensor fascia latae.[1] It is believed to activate the deep hip external rotators (quadratus femoris, obturator internus and externus, and the gemelli).[90,91] These muscles appear to play a key role in hip joint stability by stabilising the femoral head in the acetabulum.[92] It is speculated they modulate hip joint stiffness and provide finely tuned adjustments to hip joint position.

Please note that when the hip is in the flexed position the gluteus medius can no longer act as a primary hip abductor[93] and therefore this exercise does not target this muscle as much as some other exercises (such as outer thigh exercise). However, if you wish to emphasise gluteus medius activity over tensor fascia latae, clams has a more favourable ratio.[89]

Neuro tip

Ballet dancers display greater hip external rotation strength and hip external rotation range of motion compared with non-dancers.[94-96] This has been attributed to a number of factors, including "adaptive changes to the neural subsystems in response to the functional demands of ballet."[94] This could include increases in electromyographic amplitude and rate of electromyographic activation (a phenomenon found in other highly trained athletes) indicating that "improvements to the pattern of neural drive occurs with sport-specific resistance training."[97]

What to say to patients

"This exercise retrains small rotational movements which is important for stabilising your hip joint as well as providing feedback to your brain about the movements of your lower limb."

SINGLE LEG SUPINE BRIDGE

Teaching points

Anecdotally, asking the patient to place pressure through the heel (without lifting the toes) and keeping the foot close to the buttocks increases activation of the gluteus maximus. Verbal cues to maximally contract the gluteal muscles may also be beneficial – although some patients find this difficult to do without losing their natural lumbar lordosis. A sign of excessive hamstring activation is cramping or observation of a posterior pelvic tilt. You or the patient can palpate the hamstring to ensure it stays relatively relaxed.

Poor technique: posterior pelvic tilt

Alternative technique: you can increase the challenge of this exercise by straightening the free leg.

Key teaching phrases

- *"Maintain a natural curve in your lower back."*
- *"Do not let your knee drift outwards."*
- *"Do not use your hands to push up."*
- *"You should feel the muscles in your buttocks working."*

Contraindications

- Excessive pain in the knees, hips or ankles
- Back pain during this exercise
- Acute disc episodes

Evidence

Gluteus maximus activation has been observed to range between 35% and 54% of maximum voluntary contraction during this exercise.[1,98,99] Interestingly, standing gluteal squeeze has been shown to result in greater activation of the gluteus maximus. The authors speculated that substitution with the hamstrings during single leg supine bridge is a factor given that multiple subjects reported hamstring cramping during the single leg bridge and that their study was limited by the fact that gluteal squeeze was the only exercise where verbal cues were given to maximally contract the gluteal muscles.[98]

There is conflicting evidence regarding the level of activation of gluteus medius during this exercise; however, it is generally slightly less than levels observed in outer thigh exercise (side-lying hip abduction).[1,98]

Neuro tip

The increased risk of anterior cruciate ligament injuries in women is not only attributed to dynamic genu valgus but also the tendency towards increased knee joint laxity, which appears to contribute to diminished joint proprioception. A common compensation for this is increased hamstring activity.[100] Patients with a history of anterior cruciate ligament problems should be monitored for excessive hamstring activity during this exercise.

What to say to patients

- *"This exercise requires coordinated movements to activate your buttock muscles while relaxing the back of your thigh."*

DONKEY KICK (BENT LEG)

Teaching points

This exercise can be surprisingly difficult for a patient to perform without inappropriately relying on the erector spinae to contribute to the movement.

Signs of this occurring include:

- Excessive lumbar lordosis
- Observation of excessive erector spinae activity
- Patient reports 'lower back muscles working'
- Patient cannot 'feel the buttock muscles working'

Poor technique: excessive lumbar lordosis

Poor technique: excessive erector spinae activity

Correct technique: relaxed erector spinae

To address poor technique you may wish to use the following techniques:

- Place your hands on the erector spinae and ask the patient to 'relax the muscles under your hands'
- Ask the patient to contract the gluteal muscles while lifting the leg[101]
- Prescribe the exercises with a smaller range of motion – stopping the leg movement at the point in which the patient starts to use their erector spinae
- Allow the patient to use a reduced lumbar lordosis initially (this is not ideal technique; however, some patients find it beneficial to identify their gluteus maximus. Once this has been achieved they can return to using a natural lumbar lordosis)

Modification: small leg movement

Modification: reduced lumbar lordosis

Prescribing exercises on all fours (refer to beginner and intermediate exercises for the lower back) prior to this exercise may also assist in patient awareness of their spine.

You can add an ankle weight to increase the challenge of this exercise. It can also be performed in the all-fours position for those who find it difficult to rest on their elbows.

Key teaching phrases

- *"Maintain a natural curve in your lower back."*
- *"Imagine your buttock muscles are elevating your leg not your lower back muscles."*
- *"Keep your head in line with your body."*

Contraindications

- Excessive pain in the elbows, knees, hips or ankles
- Inability to maintain natural lumbar curve during this exercise
- Back pain during this exercise
- Acute disc episodes

Evidence

This exercise has demonstrated varying activation levels in different studies but can result in close to 60% of maximum voluntary contraction for gluteus maximus making it an appropriate strengthening exercise.[98,102,103]

Any decrease in force contribution from the gluteal muscles during hip extension can result in increased anterior hip force with potential for anterior hip pain, subtle hip instability or a tear of the acetabular labrum.[104,105]

Neuro tip

In recent times the focus for managing lower back and pelvic pain has moved from a strengthening approach to focusing on motor patterns. Janda developed a test to assess the muscular activation pattern during hip extension in the prone position.[106] He theorised that the muscle activation pattern in this test could mimic those used during gait. Janda taught that the pattern of activation should be hamstring first, followed by gluteus maximus, contralateral lumbosacral erector spinae, ipsilateral lumbosacral erector spinae, contralateral thoracolumbar erector spinae, ipsilateral thoracolumbar erector spinae, and finally by the thoracic erector spinae.[107] However, when studied, a variety of activation patterns have been observed in healthy subjects.[108,109] Even during gait the muscle recruitment patterns appear to be top-down in order.[110] Lehman et al. concluded: "The utility of the prone leg extension as a clinical and functional test is questionable due to the normal variability seen during the test and our current inability to determine what is normal and what is dysfunctional."[109]

What to say to patients

"This exercise is effective in strengthening the large buttock muscle, gluteus maximus. This muscle is important for controlling your hips and spine during typical daily activities such as bending and running."

DONKEY KICK (STRAIGHT LEG)

Teaching points

See donkey kick (bent leg)

Patients who are likely to use their erector spinae may find this version of the exercise more difficult. You may wish to ensure the patient has mastered donkey kick (bent leg) prior to prescribing this exercise.

Key teaching phrases

- *"Maintain a natural curve in your lower back."*
- *"Imagine your buttock muscles are elevating your leg not your lower back muscles."*
- *"Keep your head in line with your body."*

Contraindications

- Excessive pain in the elbows, knees, hips or ankles
- Inability to maintain natural lumbar curve during this exercise
- Back pain during this exercise
- Acute disc episodes

Evidence

See donkey kick (bent leg)

MONSTER WALKS

Teaching points

This exercise is best performed in the squat position as electromyographic activity is greater in the gluteus medius and maximus and lower in the tensor fascia latae compared with upright standing.[111]

If you wish to increase the activity of the gluteus muscles you can place the band more distally – around the ankle (increases about 20%) or foot (increases about 40%).[112] It is thought that the lower position creates an external rotation moment that needs to be overcome by the gluteal muscles. In addition, it increases the activation of the gluteal muscles over the tensor fascia latae.

Alternative technique: elastic band around ankles

Alternative technique: elastic band around feet

Ensure the patient does not drift into internal rotation of the lower limb as this increases the activity of the erector spinae and may result in excessive hip adduction and internal rotation.[113,114] Externally rotating the lower limbs can be used as a technique as the same level of gluteus medius activity is achieved in this position.[113] If the patient continues to struggle with technique you may need to prescribe the exercise with a lighter elastic band.

If you wish to favour one side it is important to note that electromyographic activity of the stance limb is higher than the moving limb.[113] This is because “the gluteus medius muscle must overcome band resistance in addition to the contralateral pelvic drop on the moving non-weight-bearing limb”[113]

Key teaching phrases

- *"Keep your knees in line with your second toe."*
- *"Ensure your knees don't move inwards."*

Contraindications

- Excessive pain in the knees, hips or ankles
- Limitations in hip, knee or ankle range of motion
- Posterior cruciate ligament injuries (healing needs to be well advanced)[115]

Evidence

Varying levels of gluteal activity has been observed in studies and presumably varying tensions and positioning of the elastic band could account for this.[87,93] Youdis et al. found levels of greater than 50% of maximum voluntary contraction for gluteus medius and therefore monster walks could be effectively used for strengthening.[113] The activity of gluteus maximus was less than 40%.[113]

In their study Begalle et al. found monster walks to have lower quadriceps-to-hamstrings coactivation ratios compared with lunge-type exercises suggesting it is a beneficial exercise for knee injury prevention and anterior cruciate ligament rehabilitation.[116]

Neurotip

It has been evident for some time that the hip adductors and abductors play an important role in balance control in the medial lateral direction during standing and walking.[117] The ankle inverters and evertors only play a very small role (as opposed to anterior posterior balance control where the ankle flexors and extensors have a dominant role).

What to say to patients

"This exercise strengthens the gluteus medius muscles on the side of your hip. They can help improve and prevent any inward movement of your knees. This could be beneficial to prevent injuries during jumping and landing activities."

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