Sciatic Nerve
A Case Report of the Treatment of Piriformis Syndrome
(Muscle Related)
Abstract

Objective: The study assessed the benefits of Pilates training to alleviate pain caused by the compression of the sciatic nerve by the piriformis muscle.

Methods: A protocol of seven weekly one hour Pilates exercises utilizing the Reformer, Cadillac, and Mat. Focus of the work centered on the muscles and bones of the lower back, posterior and anterior legs.

Results: After the first two weeks, subject was free of any sciatic pain for five days. When pain returned, client was able to recognize what triggered the flare-up and shifted her patterns of movement to abate the discomfort. There was a reoccurrence of chronic pain in the fifth week due to habitual patterns and work-related stress that required massage to remedy. From the seventh week on piriformis syndrome discomfort was rarely experienced.
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Anatomical Description:

Sciatica is generally caused by the compression of a lumbar spine nerve root L4 or L5 or sacral nerve roots S1, S2 or S3, or far less commonly by compression of the sciatic nerve itself.

Pseudo-sciatica, which causes symptoms similar to spinal nerve root compression, is caused by the compression of peripheral sections of the nerve, usually from soft tissue tension in the piriformis or related muscles. One possible cause of this is the piriformis syndrome. In this condition the piriformis muscle, located beneath the gluteal muscles, contracts spasmodically and strangles the sciatic nerve beneath the muscle.

The sciatic nerve runs through the piriformis muscle in the buttocks region. When the muscle shortens or spasms due to trauma, it can compress the sciatic nerve. This cause of sciatic symptoms is piriformis syndrome, a major cause of sciatica. The approach to treating Sciatica is to reduce the compressive forces causing the pressure upon the sciatic nerve. When the sciatica is piriformis muscle-related, this can be accomplished through manual muscle stretching, massage and mobilization techniques. General therapeutic goals include helping the muscles loosen, thereby lessening pain, and to minimize inflammation.
Case Study:

This study assessed the benefits of weekly Pilates exercise program and stretching to alleviate chronic pain caused by the compression of the sciatic nerve by the piriformis muscle.

Profile of client: Subject, a 43-year-old active female (Vanessa), works in a corporate setting as an executive in Business Affairs. Subject has experienced chronic pain for the past few years. Pain is experienced in the right gluteal region that travels inferior along the lateral side of the leg and down along the fibula. Client’s desired outcome is to manage the pain with the hope to be pain free.

Table 1. Profile of client at start of study

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Degree of Pain</strong></td>
<td>Level 7 intensity on scale from 1-10</td>
</tr>
<tr>
<td><strong>Frequency of Pain</strong></td>
<td>3 to 7 times a week, sometimes more than once a day</td>
</tr>
<tr>
<td><strong>Pharmacological use</strong></td>
<td>600mg ibuprofen as needed, 1 to 2 doses daily</td>
</tr>
<tr>
<td><strong>Work activity</strong></td>
<td>Pain triggered by sitting for long periods of time</td>
</tr>
<tr>
<td><strong>Personal activity</strong></td>
<td>Standing and walking in high heels for long periods of time, running 6 miles per day on cement</td>
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Treating Vanessa’s piriformis syndrome was addressed by focusing on the surround muscles that are compressing the nerve. The basic BASI block system was utilized accordingly as outlined herein:
Mat Work included: Pelvic Curl (use pillow to elevate head as an assist) (fig 1); modification of spine twist by keeping one leg straight and arms down by side – grab leg with opposing arm, bend knee and pull towards other leg (fig 2); Chest lift (fig 3); Single Leg lift w/Assist (fig 4); 100’s Prep, Roll Up, Leg Circles, Hamstring Pull 1 (fig 5); Shoulder Bridge Prep; Rolling Like a Ball; Spine Stretch; Single Leg Kick; Back Extension (fig 6 a-c), Swimming (fig 7); Cat Stretch; Front Support, Seal Pup; Childs Pose (fig 8).

Reformer, Cadillac and Wunda Chair work included: Basic foot work (light resistance on 1 Red and 1 Blue); Abdominals work: Roll Up with Roll Up Bar, Mini Roll Ups, Roll Up Top Loaded, Hundreds Prep, Standing Pike, Full Pike (on low spring), Hip work: Frog, Openings, Circles; Spinal Articulation: Bottom Lift with Extension, Short Spine; Stretches: Hamstring Stretch Standing; FBI 1: Scooter, Elephant, Push Through Series (Sitting Forward, Side Reach, Saw); Arm work: Arms Supine, Sitting series alternatively (kneeling as we progressed); Additional Leg Work: Squats, Leg Press Standing, Side Leg Lift, Forward and Lift, Forward with Drops; Lateral Flexion: Mermaid, Side Stretch, Kneeling Side Stretch; Back Extension: Breaststroke Prep, Pulling Straps 1 and 2, Swan 1 Basic, Swan on the Floor.
Table 2. Profile of client during the study

<p>| | |</p>
<table>
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<tbody>
<tr>
<td>Degree of Pain</td>
<td>Pain moved from a level 7 to 3</td>
</tr>
<tr>
<td>Frequency of Pain</td>
<td>On a weekly basis, moved between 2 to 3 times, and often there was no pain experienced</td>
</tr>
<tr>
<td>Pharmacological use</td>
<td>600mg ibuprofen taken occasional in response to a flare-up of symptoms</td>
</tr>
<tr>
<td>Work activity</td>
<td>Occasional flare-up if seated at meetings for hours.</td>
</tr>
<tr>
<td>Personal activity</td>
<td>Occasional flare-up standing or walking in high heels</td>
</tr>
</tbody>
</table>

Although Pilates did not alleviate all symptoms all the time, the protocol did reduce the level of pain and frequency of episodes of discomfort. Educating the client on proper alignment of neutral pelvis and neutral spine in order to be aware of her stance, gait and movement patterns that exacerbated her syndrome was beneficial in reducing her pain.

Table 3. Comments made by the client throughout the process

a.) During or after sessions:
1st session: Feels a tingling sensation in legs
2nd session: Sore feeling from last session greatly reduced
3rd session: Feels condensed when pain returns
6th session: Great improvement all week with no pain
8th session: A little twinge when sitting for long periods
10th session: Feeling great

b.) A week after the end of the case study
"I have become more aware of how I stand, walk, and sit since all of these contribute to my discomfort. I make adjustments more quickly to prevent or reduce pain. Exercises given help me stretch and release tension I build up on a daily basis." No return of pain currently seven days after final treatment.
Since Vanessa’s functional deficits included: tight Piriformis muscle, tight hip external rotators and adductors and hip abductor weakness; her Pilates’ session included emphasis on stretching and strengthening the hip rotator, adductor and abductor muscles. Targeting the Piriformis was done with a single knee to the chest with painful side cross-over. The stretching exercises were performed three times a day, five times each time, maintaining the stretch between 5-10 seconds. We applied heat for 15 to 20 minutes before the stretching exercises were done in order to increase the elasticity of the muscle, and ice for five minutes afterward in order to reduce the inflammation produced by the stretching exercises. Prolonged stretching of the Piriformis muscle was accomplished in a supine position with the involved hip flexed and passively adducted/internally rotated.
**Conclusion:**

This study demonstrates that daily strengthening and stretching of the piriformis and surrounding muscles to reduce piriformis syndrome in general, especially during a flare-up, is possible with appropriate flexion, extension, adduction, abduction and lateral flexion exercises.
References:


http://orthopedics.about.com

www.Mayoclinic.com

www.Sportsmedicine.com

www.emedicine.com
Exhibits 1-8
Additional Stretches

**The Piriformis stretch**
Tuck the right leg underneath the body so that the knee is in line with the left shoulder. Press the hips to the right until a gentle "pull" is felt in the right buttocks.

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**Soleus Stretch**
The right knee is bent and is pushed towards the ground while staying over and just in front of the foot. A gentle pull should be felt in the lower one third of the leg (highlighted in yellow). The knee can then be directed medially and laterally to stretch different areas.
Keep the knee straight and heel on the floor. Gradually lean forward -- usually against a wall-- until a gentle pull is felt in the upper 1/3 or 1/2 of the lower leg (knee to mid-calf)
# Iliotibial Band Stretch

## Side View.

1. Place the right leg behind the left.

2. Bend at the waist, leaning over a support, such as a desk or counter.

3. As you bend the left knee, slide the right leg out away from your body. Keep the right knee straight.

4. Bend your body toward the right leg.

You should feel a stretch along the outside of the right thigh.

## Front View.

The "desk" has been removed to better demonstrate the stretch.

If you lean your upper body towards the leg you are stretching, then this will better stretch the IT band. In the example, the figure would bend (at the waist) to the right side of the screen. (the figure's left hand side)
Iliotibial Band stretch

This stretch is more passive than the other IT band stretch.

- Use a bench or couch
- Extend the leg back behind the body
- Relax the muscles a let gravity pull the leg down
- Ten to fifteen minutes should result in a good stretch
- If needed ankle weights can be added, or another person can help by applying gentle pressure
- Like all stretches, if done right it should NOT be painful.
This stretch is useful for both *hip flexors* and *hip extensors*. Pressing the pelvis forward and down facilitates this stretch.

Piriformis Stretch:

**TOP VIEW**

Piriformis Stretch: VIEW FROM UNDERNEATH

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• Place the right knee on the ground roughly in line with your left shoulder
• The right foot should be just in front of the left knee
• Press your hips towards the ground so that your bodyweight is on your right leg.
• As you move down the right knee comes closer to the left shoulder.
• You should feel a gentle pull deep in the right hip / buttocks.

For further information about overuse injury of the piriformis muscle read, the piriformis syndrome article.

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Squats

One of the best exercises for runners, whether recovering from an injury or trying to prevent one, is the one leg squat.

Goals

• Strengthen stabilizers (e.g. adductors)
• Improve balance
• Enhance pelvic stability
• Demonstrate areas of weakness or instability

Method

1. Balance on one leg. Flex the knee of your non-weight bearing leg so that the foot is pointing toes down, behind you. This is a similar position to the recovery phase in running.
2. Keep the arms loosely out to the side to assist in balance. Don't grab on to anything for support.
3. Bend at the knee, and lower yourself. Go down to approx. a 90-degree bend at the knee, and then back up again.
4. Keep your balance, and observe if you have more difficulty with one leg.
5. Watch yourself in a mirror. Concentrate on keeping the pelvis in a stable plane. Look for an abnormal side-to-side tilt, or ant/post tilt.
6. Usually, 3 sets of 20 for each leg is sufficient Color
7. As you get better at this, add some weight. You can do this with hand held weights, or a bar across the shoulders.

Back Extensions

Back extensions are a great exercise to strengthen the extensor muscles in the back. Stronger back muscles can help treat or prevent back pain in both runners and cyclists. It is an excellent exercise for triathletes who must spend a lot of time in the "aero-" position on the bike

1. Find a padded bench which gives you enough clearance and has a way to anchor the feet.
2. Clasp the hands behind the neck and bend at the waist up and down in a smooth, controlled motion.
3. Small weight plates (e.g., 2.5, 5, 10 or 25 lbs) can be held behind the neck to give added resistance.
4. Like other exercises this one should NOT be painful.

**Hip Exercises for runners**

There are 4 exercises in this section that are an excellent addition to any runners training program. They are often used as part of a rehabilitation program for treating an injury, but are also useful for general conditioning and injury prevention. They focus on the muscles used for power and stability.

1. Hip abduction
2. Hip adduction
3. Hip flexion
4. Hip extension
Hip abduction and Hip Flexion

**Hip abduction** is the opposite motion of that pictured above

**Hip Flexion**

**Hip adduction** is the opposite motion of that pictured above

**Hip extension** is the opposite motion of that pictured above

Although there are exercise machines which simulate these actions, these exercises are best done standing with a pulley system (as illustrated). If needed, one or two fingers of the hand of one arm may be used to hold on to an adjacent support (e.g., frame or upright bench). The reason for minimal support is that it helps emphasize correct balancing by the muscles in the pelvis and leg. Sets of high repetition, with low resistance should be done.