Pilates Rehabilitation for Bulging Disc in Lumbar Spine

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Abstract

Every year millions of Americans suffer from low back pain as a result of bulging discs. This study determined whether or not Pilates is an effective method for the treatment of low back as a result of bulging discs in the lumbar spine. A Pilates program designed specifically for the alleviation of low back pain was implemented for a client who currently has bulging discs and chronic low back pain. The program consisted of thirty one hour long private sessions over the course of fifteen weeks. After the completion of the conditioning program the client reported complete alleviation of their back pain, improved posture and increased range of motion in the spine.
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The lumbar spine is the area most commonly referred to as the lower back. It consists of five vertebrae that form a lordotic curve. Each vertebra consists of a body and an arch. The body of the vertebrae is large and cylindrical, which provides the surface in which each vertebrae is joined. The vertebral arch consists of two pedicles, which attach to the body, and two lamina, which attach to form a spinous process. Each vertebrae is separated by an intervertebral disc. The intervertebral disc is composed of two materials. The outer layer of the disc is called the annulus fibrosus, which is composed of fibrocartilage arranged in concentric circles. The second material is the nucleus pulposus, which forms the center of the disc. It consists of a gelatinous substance.
that allows for movement and acts as a shock absorber and weight bearer. (Calais-Germain, 2007) A bulging disc occurs when there are cracks or tears in the annulus fibrosus and the gel of the nucleus pulposus is pushed through these openings. Pain from a bulging disc is a result of the bulge pressing on the spinal nerve. In some cases, this can lead to sciatica, or nerve pain, down the leg and buttocks.

**Case Study**

The client involved in the study is a 26 year old female named Katie. Katie has been suffering from low back pain for the past ten years. Her back pain began in the form of muscle spasms ten years ago that came on during a softball game. Upon visiting a doctor, muscle relaxants and anti-inflammatory medications were prescribed and an MRI was ordered. Her MRI revealed that she had bulging discs at L₄-L₅ and L₅-S₁. At the time her doctor recommended physical therapy that consisted of exercises to strengthen the core and back as well as manual therapy.

Physical therapy provided temporary relief of low back pain, but did not completely alleviate her symptoms. Over the course of the next eight years she continued to experience low back pain, but remained active. Her activities consisted of softball, basketball, soccer, running, hiking, tennis and yoga. Two years ago her back pain began to increase in intensity after she began working long hours at a new accounting position. As her pain increased, her level of activity decreased. After visiting the doctor again, he ordered an MRI to check on the status of her bulging discs and found that they had not healed from ten years before. He prescribed pain medication and physical therapy to alleviate her pain. In addition to her physical therapy, a Pilates conditioning program was also recommended. The only contraindications given by her physical therapist and doctor were to avoid flexion, especially weighted flexion, as this would
further increase the bulging of her discs. No other limitations were given. Upon initial intake and postural assessment, in addition to bulging discs, client also has hyperlordosis.

**Conditioning Program**

<table>
<thead>
<tr>
<th>Sessions</th>
<th>1-10</th>
<th>11-20</th>
<th>21-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warm up</td>
<td>Bridge&lt;br&gt;Leg lifts&lt;br&gt;Spine twist supine with feet on ball&lt;br&gt;Modified chest lift</td>
<td>Bridge with arm exchange&lt;br&gt;Leg changes&lt;br&gt;Spine twist supine with feet on ball&lt;br&gt;Leg circles</td>
<td>Bridge with leg extension&lt;br&gt;Leg changes&lt;br&gt;Spine twist supine&lt;br&gt;Leg circles</td>
</tr>
<tr>
<td>Foot Work</td>
<td>Reformer- heels, toes, small v, wide v heels and toes, calf raises, prances</td>
<td>Tower - heels, toes, small v, wide v heels and toes, calf raises, prances</td>
<td>Tower - heels, toes, small v, wide v heels and toes, calf raises, prances</td>
</tr>
<tr>
<td>Abdominals</td>
<td>Chest lift on arc</td>
<td>Reformer - hundred prep, hundred, and coordination (modified)</td>
<td>Reformer short box series - flat back, tilt, twist, roundabout</td>
</tr>
<tr>
<td>Hip Work</td>
<td>Reformer - Frog, Circles (down, up), Openings</td>
<td>Tower - Frog, Circles (down, up), walking, bicycles</td>
<td>Tower - Frog, Circles (down, up), walking, bicycles</td>
</tr>
<tr>
<td>Spinal Articulation</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Stretches</td>
<td>Ladder Barrel - hamstrings and hip flexors</td>
<td>Reformer - standing lunge</td>
<td>Reformer - standing lunge</td>
</tr>
<tr>
<td>Full Body 1</td>
<td>Scooter in flat back</td>
<td>Front Suppot, back support</td>
<td>Down Stretch</td>
</tr>
<tr>
<td>Arm Work</td>
<td>Reformer - Supine arm series</td>
<td>Standing Arm Series (Tower) - extension, hug a tree, up and down circles, punches, biceps</td>
<td>Reformer - arms sitting series</td>
</tr>
<tr>
<td>Full Body II</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Additional Legs</td>
<td>Hamstring Curl on Chair</td>
<td>Chair - Hip Opener</td>
<td>Single leg skating</td>
</tr>
<tr>
<td>Lateral flexion</td>
<td>Chair - Side Stretch</td>
<td>Chair - Side Kneeling Stretch</td>
<td>Side Kick</td>
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<tr>
<td>Back Extension</td>
<td>Chair - Swan Basic</td>
<td>Chair – Swan on the floor</td>
<td>Swimming</td>
</tr>
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</table>
This program was designed with the following goals in mind: decrease pain, increase range of motion and improve posture. The emphasis of the program is on the following: strengthen the abdominal muscles, particularly the transverse abdominis and obliques in order to increase pelvic-lumbar stability; strengthen the spinal extensors; and stretch and strengthen the hip flexors and hamstrings in order to address hyperlordosis. For bulging discs all flexion is contraindicated while the client is experiencing pain, especially loaded flexion (Calais-Germain, 2007, p. 42). The above program was designed to strengthen the core and increase mobility, while reducing further strain on the low back and preventing re-injury in the future.

The warm-up is designed to prepare the client for the rest of the workout. The bridge will be performed instead of the pelvic curl in order to avoid flexion. The emphasis will be on recruitment of the transverse abdominis, pelvic floor muscles and hip extensors in order increase pelvic stability (Isacowitz, 2011, p. 52). Leg lifts will increase pelvic stability and will further increase emphasis on strengthening the transverse abdominis, since they are vital trunk stability and maintenance of neutral spine (Isacowitz, 2011, p. 57). The spine twist supine is performed in order to train proper spinal and pelvis alignment while rotating. For the initial sessions, a ball will be placed underneath the feet in order to reduce the tendency of arching the low back, until the abdominals are strengthened. The range of motion on this exercise will be reduced in order to prevent too much torsion on the spine, which decreases the space between vertebrae and compresses the nucleus (Calais-Germain, 2007, p. 41). The chest lift will be performed with a small ball placed behind the lower back. The movement will focus on the extension portion of the movement and the client will only lift up to the neutral position. This will prevent any flexion that could exacerbate the disc protrusion. Addition of the leg circles in later sessions will help
increase pelvic-lumbar stability and provide a light stretch to the hamstrings and low back (Isacowitz, 2011, p. 72).

The footwork will be performed on the reformer first until proper stabilization of the pelvis can be maintained throughout the movement. Emphasis will be placed on engagement of the hamstrings in order to strengthen them to help correct the hyperlordosis. Footwork will progress to the Cadillac, where further emphasis of pelvic-lumbar stabilization will occur. Also, this will provide a stretch while increasing strength to the hamstrings.

The abdominal block is particularly important for this client because they have the ability to improve posture and alignment, enhance movement, and prevent risk of certain back injuries (Isacowitz, 2011, p. 14). All abdominal work in this program is to be performed in neutral spine or from the extension positive and moving to neutral spine. All spinal flexion will be avoided, which is why chest lift will be performed on the arc. The hundred prep, hundred, and coordination will all be modified in order to avoid flexion as well. The client will perform these exercises in order to increase pelvic stability while the head and chest remain down on the reformer. As their strength and stability increases, the reformer short box series will be incorporated with the removal of round back and climb a tree in order to avoid flexion.

Like footwork, hipwork will also help increase pelvic-lumbar stability. Increasing range of motion of the lower body while maintaining stability of the pelvis will help protect the client from future low back injuries. Strengthening the hamstrings will also help improve hyperlordotic posture. Spinal articulation will be avoided for this client due to the flexion required for spinal articulation. The stretches selected for this program include lengthening the hip flexors in order to help improve hyperlordosis and hamstring stretches which may help relieve low back tightness.
For full body integration, the scooter will be modified from its usual flexed position into a neutral spine position. This will avoid putting further pressure on the disc protrusion while increasing pelvic-lumbar stability. The scooter will also increase hamstring strength to address the client’s weakness. Front support and back support will increase overall core strength and stability. Both back support and down stretch are included to help strengthen the back extensors, which is essential for proper posture and prevention of certain back injuries (Isacowitz, 2011, p. 16).

For additional leg work, the exercises chosen were designed to increase pelvic-lumbar stabilization while increasing hamstring, adductor and gluteus maximus strength. Weakness in the gluteus maximus and hamstrings can lead to hyperlordosis and strengthening these muscles will help improve the client’s posture.

For lateral flexion, side stretch on chair was chosen in order to help strengthen the obliques, which are needed for spinal stability (Isacowitz, 2011, p. 14). The stretch at the end of this exercise may also help loosen low back muscles that are tight for the client. Side kick was chosen for its ability to develop lateral core stability. It involves the proper recruitment of all lateral stabilizers of the spine due to the movement of the leg (Isacowitz, 2011, p. 151). It also strengthens the hamstrings and gluteus maximus.

The back extension block of this program is highly valuable because the back extensors provide stability to the spine and protect it from injury (Isacowitz, 2011, p. 15). This will also provide muscle balance for all of the exercises emphasizing abdominal strength. Back extension on the chair and on the floor both strengthen the spinal extensors while co-contracting the abdominals to protect the lower back. Swimming provides an even greater challenge to core
stability. It is particularly helpful for strengthening the back for bulging discs because it involves the use of the lumbar multifidus for rotation (Isacowitz, 2011, p. 186).

Conclusion

Low back pain is an issue that affects millions of Americans every year. A common cause of low back pain is bulging discs, which can arise from an acute injury or from repeated trunk flexion. Bulging discs can be a source of extreme discomfort and may even result in disability for some. The purpose of this case study was to determine whether or not Pilates is an effective method for the treatment of low back pain as a result of bulging discs. From the implementation of the above prescribed conditioning program, the client was able to improve their posture, reduce their low back pain and increase their range of motion over the course of thirty private sessions. Initial improvement in pain and core strength was seen after the first ten sessions. By increasing the difficulty of the exercises and continued challenges of core stability, the client saw greater improvement in pain reduction and mobility in subsequent sessions. Overall, Pilates has proved to be a beneficial conditioning program for the improvement of low back pain as a result of bulging discs.
Bibliography
