Pilates for Lower Back Injuries:
Alleviating Pain Associated With Anterior Disc Herniation

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Abstract

It is estimated that roughly 80% of adults will suffer from back pain at some point during their lifetime, making it the leading cause of workplace absence and restrictions in physical activity. Often times the cause is not easily diagnosed, however a small fraction of the time, the severe pain is a result of a lumbar disc herniation. A herniation occurs when excessive force or wear and tear on one side of the disc causes the inner portion of the disc to break through the outer ring on the opposing side, resulting in pressure being placed on the surrounding nerve roots and soft tissues. The increased pressure can lead to very high levels of pain in the lower back, and in some cases spanning down the legs. It is generally believed that the best form of treatment is to decompress the affected area of the spine, and to do so with exercise. Due to the amount of focus placed on the abdominals and back extensors, implementing a Pilates program is a wonderful way to strengthen the musculature of the trunk to provide stability, and thus alleviate pressure on the spine (including the effected area).
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Anatomy of the Spine

The spine is composed of 33 vertebrae which progress in size from neck to pelvis and are divided into five regions: cervical, thoracic, lumbar, sacrum, and coccyx. An intervertebral disc connects neighboring vertebrae allowing for movement, shock absorption and weight bearing. The spine has a series of four alternating curves which serve to absorb stress and to enhance movement. The lumbar region consists of the five vertebrae extending just below the last rib to the pelvic girdle. These vertebrae are large and strong in order to enable their primary function as the main support of the body’s weight and movements of the lower back. The most important muscles groups in relation to spinal stability and mobility are the abdominals and the back extensors respectively. In regards to stability and rehabilitation, the transversus abdominis (within the abdominal group) and the multifidus (within the spinal extensor group) are the most vital. Another important muscle of the lumbar spine is the iliopsoas, which connects the vertebrae to the pelvis and is imperative for maintaining normal curvature of the lumbar spine.
Vertebral Anatomy and Anterior Disc Herniation

Each vertebra is divided into a main body and a vertebral arch, and is connected anteriorly to neighboring vertebrae by an intervertebral disc. Posteriorly, the vertebrae are connected by paired facet joints. While the intervertebral discs are imperative for shock absorption, the facet joints allow small gliding movement. The intervertebral discs which connect and cushion adjoining vertebrae are composed of a strong outer layer of crisscrossing fibrous tissue (annulus fibrosus) and an inner gelatinous central mass (nuclues pulposus). The nucleus pulposus is responsible for equally distributing pressure experienced from the vertebral bodies during movements of the spine. A disc may become herniated when the nucleus is no longer able to normally function, leading to tears in the annulus caused by the increased pressure on the nucleus. This allows fluid from the nucleus to escape and cause compression on the surrounding nerve root and soft tissues. Although aging and normal wear can lead to disc herniation, it can also occur when excessive force is placed on the opposite side of the disc. This is often seen in chronic spinal flexion movements when the disc ruptures posteriorly. However, there are instances when continuous pressure on the posterior side leads to an anterior disc herniation. Individuals with an anterior disc herniation in the lumbar spine may experience one or more of the following symptoms in the lower back, buttocks, legs and toes: pain, numbness, weakness, aching, and throbbing.
Pilates for Anterior Lumbar Disc Herniation

When addressing pain associated with an anterior lumbar disc herniation, the main focus is to reduce forces placed on the spine. Postural deviations contribute to undue stress on the bones, joints, ligaments and muscles, and thus the goal should be to return the body to proper alignment. Strengthening the muscles of the “Powerhouse” (abdominals, lower back, and pelvis) is the key component of good alignment; therefore great emphasis should be placed on these muscle groups. In particular, the transversus abdominis and the multifidus are vital for developing stabilization of the trunk. Additionally, it is important to work the obliques in conjunction with the transversus abdominis to create intra-abdominal pressure which will reduce forces borne on the spine.

As a herniation occurs opposite the side of the spine which is receiving excessive force or wear and tear, an anterior disc herniation is a result of that force occurring on the posterior side. Therefore, it is extremely important to note that clients with this issue should not be taken in to back extension to prevent further injury. Not only should the back extension block be eliminated from the session(s), other exercises which put the client into extension, such as the down stretch on the reformer, should not be performed. To ensure that the back extensor muscle group is addressed as a key component of the Pilates program, clients should be given exercises that require seated positions.
Case Study

Kathi, age 51, decided to seek an exercise program to alleviate lower back pain resulting from an anterior disc herniation in the lumbar spine after several rounds of back injections had failed to offer long term relief. During our initial meeting, Kathi disclosed that she has both an anterior disc herniation at L3-L4 and L4-5, in addition to mild multi-level spondylosis. An avid yogi for many years, she also described having loose ligaments resulting in pelvic instability. In addition to information gathered during our discussion, I completed a thorough body assessment and observed her posture along the plumb line, noting a decreased curve in the lower back, commonly associated with Flat Back posture, and slightly rounded shoulders. Lastly, I inquired as to any guidelines her doctor had given her; it was instructed that she should focus on exercises which promote neutral spine position and work towards strengthening her abdominals, hamstrings and gluteal muscles.

Taking into account the client’s condition and her personal objectives, we outlined short term, intermediate and long term goals. In order to best achieve the outlined goals, Kathi committed to three sessions per week for an ongoing period of time.
Program Design Methodology

In structuring the program, the primary objective was to assist the client in finding relief from intense back pain resulting from her anterior herniation of the discs in the lumbar spine. To move the client in that direction, the initial focus was to familiarize the client with basic elements of Pilates, building a strong foundation from which to achieve the long term goals. Having practiced and taught yoga for many years, great emphasis was placed on the Pilates breathing technique in order to promote proper muscle recruitment and to maintain a consistent contraction of the abdominals. The exercises also focused on working from a neutral spine position (particularly while moving the upper and lower extremities) to increase pelvic lumbar stability.

Once the basic principles were achieved, the intermediate goals included: strengthening the muscles of the “Powerhouse” (particularly the abdominals, gluteals and hamstrings) which support the weight-bearing lumbar spine and pelvis, strengthening the multifidus to assist in the stabilization of the spine, working the lower back extensors to help shift the pelvis from a slight posterior tilt, increasing flexibility in the hip flexors and quads with strengthening and stretching exercises, and strengthening the shoulder external rotators and stretching the pectorals to prevent rolling forward of the shoulders. So as to not exacerbate the client’s injuries, the Back Extension Block was eliminated from the program and additional exercises focusing on the upper back extensors and shoulder external rotators were chosen (i.e. Rowing Front 2, Rowing Back 2, Spine Stretch, Side Kick, Arms Sitting Series: Rhomboids, etc.).

By increasing strength and flexibility in the muscles of the “Powerhouse”, the long term goal was to restore the spine to a healthy function with increased range of motion, free from undue stress on the intervertebral disc resulting in alleviation of lumbar back pain.
Repertoire

The following chart represents examples of exercises used during sessions 1-10, 11-20 and 21+. Exercises are highlighted in red which focused on the primary goal of strengthening and stabilizing the spine by use of abdominals and back extensors.

<table>
<thead>
<tr>
<th>Block</th>
<th>Sessions 1-10</th>
<th>Sessions 11-20</th>
<th>Sessions 21+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warm Up</td>
<td>Mat: Pelvic Curl, Chest Lift, Chest Lift w/Rotation, Leg Lifts, Leg Circles</td>
<td>Mat: Pelvic curl, Supine Spine Twist, Chest Lift, Chest Lift w/Rotation, Hundred Prep</td>
<td>Mat: Pelvic Curl, Supine Spine Twist, Cadillac: Warm up Series - Roll Up w/RU Bar, Mini Roll-Ups, Mini Roll-Ups Oblique, Roll-Up Top Loaded</td>
</tr>
<tr>
<td>Abdominal Work</td>
<td>Avalon: Hundred Prep, Leg Changes</td>
<td>Wunda Chair: Standing Pike Reverse, Pike Sitting</td>
<td>Cadillac: Breathing with Push Through Bar, Teaser 1</td>
</tr>
<tr>
<td>Full Body Integration A/M</td>
<td>--</td>
<td>--</td>
<td>Cadillac: Push Through Group-Kneeling Cat Stretch, Saw</td>
</tr>
<tr>
<td>Lateral Flexion/Rotation</td>
<td>Wunda Chair: Side Stretch</td>
<td>Mat: Spine Twist, Side Kick</td>
<td>Wunda Chair: Side Kneeling Stretch</td>
</tr>
<tr>
<td>Back Extension</td>
<td>Block will not be included in program to prevent exacerbating the client's injuries.</td>
<td><em>End Each Session With Standing Roll Down</em></td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

Initially progress with the client was slow; it was challenging for her to retrain her breathing technique from her years of yoga instruction and also to connect to her transversus abdominis due to having had two abdominal surgeries. I cued the client to imagine bringing the ischial tuberosities, pubis and sacrum together, and she was finally able to connect to the TA and gradually physically feel the contraction. Once we were able to move her from the yoga breathing technique to the Pilates breath, she was able to properly recruit her muscles and her progress began to gain momentum. After her first 10 sessions, she was much more stable in the pelvic lumbar region and was gaining strength in both the lower back extensors and abdominals. Pain was still present in the lower back, but much less frequent and severe. From this point we were able to move into some of the intermediate repertoire for sessions 11-20 where continued progress in strength of the abdominals and spinal extensors were noted, in addition to increased flexibility of the hip flexors. The client is currently continuing to work and refine exercises in the intermediate repertoire with increased strength and flexibility. She has had a significant reduction in lower back pain, and is now only feeling minimal pain 1-2 times per month. Therefore, it should be noted that a well-planned Pilates program focusing on building the abdominals and back extensors can reduce stress on the spine, alleviating pain as a result of an anterior disc herniation of the lumbar spine.
Bibliography


Images


