Degenerative Disc Disease

The benefits of Pilates.

How Pilates can help to prevent the advancement

or worsening of disc degeneration.

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Abstract

Degenerative disc disease (“DDD”) is a condition characterized by damage to the intervertebral discs. It can manifest anywhere along the spine, however, it is most common in the lower back (“lumbar”) area. The spinal column is one of the most vital parts of the human body, supporting our trunks and making all of our movements possible. When the spine is injured and its function is impaired the consequences can be painful and even disabling. A number of patients will develop chronic or degenerative spinal disorders that will be disabling. DDD is part of the natural process of growing older and to a certain degree this process happens to everyone. However, not everyone who has degenerative changes in their lumbar spine has pain. Many people who have “normal” backs have MRI scans that show disc herniations, degenerative changes, and narrowed spinal canals. Every patient is different, and it is important to realize that not everyone develops symptoms as a result of degenerative disc disease.
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Anatomical Description

Humans are born with 33 separate vertebrae. The lumbar spine consists of 5 vertebrae called L1 through L5. Below the lumbar spine, 9 vertebrae at the base of the spine grow together. Five form the triangular bone called the sacrum. The two dimples in most people’s back are where the sacrum joint the hipbones, called the sacroiliac joint. The lowest 4 vertebrae form the tailbone or coccyx. Discs are located between each vertebra of the spinal column. The vertebrae are individual bones attached to each other by a multitude of small ligaments and spinal facets joints.
The spinal vertebrae surround and protect the spinal cord as it extends from the base of
the brain through the spinal canal to the base of the spine. There is one large nerve root
extending from the spinal cord between each vertebra and both the right and left sides.
Vertebrae are shaped with holes or foramen to allow the nerve root to freely pass and exit
between each vertebra. There are discs between each vertebra of the spine, these discs help to
separate the vertebrae to allow for movement. They also help to create the space between
each vertebra through which each nerve root exits the spinal column. Discs act as a shock
absorber between vertebrae and add flexibility to the spine. The cumulative effect of the micro
traumas or injuries that occur in our lives can cause the fibers of discs to become weak. These
fibers on the outer parts of the discs are called annular fibers. Inside the center of the disc is a
material called the nucleus pulposis. Imagine a jelly filled doughnut, the annular fibers are the
outside and the nucleus pulposis is the filling. Abnormal biomechanics of the vertebrae can
cause gradual wear and tear on the discs annular fibers. As the discs fibers weaken or become
injured a bulge of the disc can develop. In some cases disc fibers rupture allowing the nucleus
pulposis material to protrude creating a disc herniation. This protruding disc material can press
on a nerve root which can result in radiating pain, burning, numbness and tingling. In severe
cases of lumbar DDD, where there is evidence of nerve root compression, individuals may
experience symptoms of sciatica and back pain and sometimes even lower extremity weakness.
As the body ages, the boundary between the two parts of the disc becomes less obvious and
with increasing age the center of the disc generally becomes more stiff and fibrotic and less gel
like. The loss of this gel like structure in the disc has a major effect on the discs load bearing
ability. Injuries to the spine caused by whiplash, jarring injuries, misalignment or repetitive
activities can increase the onset of disc degeneration. Most cases of disc degeneration involve poor posture of the head and upper torso. Quite often disc degeneration combined with bone spurs and wear and tear of the vertebrae occurs at the same time. These changes in the health of the spine and its discs are forms of osteoarthritis and DDD. Once a disc has begun to degenerate there is no reversing the process. Discs function best when they are well hydrated so drinking plenty of water can maintain disc health. Smoking has been shown to be a significant factor in decreasing disc health thus reducing or quitting smoking is also beneficial. Proper spinal biomechanics can help delay the advancement of the degenerative process.

In many situations, doctors will order a MRI scan in order to evaluate the degenerative changes in the lumbar spine more completely. It is important to work with the doctor or chiropractor to prevent future flare ups from developing and to stop the advancement of the wear and tear process by improving the alignment of the vertebrae of the neck and back.

Pilates is an exercise method designed to elongate and strengthen the body by emphasizing balance, alignment, proper breathing, and core stability. Doctors recommend its simple, low-impact approach as one of the safest forms of exercise, ideal for injury prevention, rehabilitation and overall physical health. Pilates can be beneficial for just about everyone regardless of age and fitness level.
Case Study

Mary is a 50 year old female who has been physically active most of her life. 8 years ago she had a traumatic injury on a boat. She started to feel pain all the way down in her right leg. After visiting her primary physician doctor she was told that the pain should go away by itself in a couple of months. She was given strong pain killers for several months. The sciatica pain receded but the movement in her back was restricted. The x-ray and MRI showed that she had not only scoliosis but lumbar spondylosis with multilevel DDD with superimposed disc bulge in L3-L4 and facet arthropathy and possible encroachment of the exiting right L4 nerve root at L4-5. She became a chronic pain patient and went into a terrible depression. She was unable to work or even muster a smile for many years. On top of the depression she was tired, worn out, cynical and angry.

Back surgery was recommended but she instead opted for non-surgical procedures and had decompression done. She concentrated on getting proper rest and after that stretching. Since then periodic massages, acupuncture and walking has been used to cope with the pain.

Fortunately, the difficult period is over and now her life is different.

I have known Mary for some time and she had been doing 30 min walk every day and workout on elliptical trainer and upper body ergometer. She started practicing Pilates about 2 months ago. She mentioned that she still experiences pain early in the morning after waking up, a dull ache and stiffness. This slowly gets better once she starts moving but tightness and lower back pain occurs when sitting or standing for extended periods. Simple activities such as driving, traveling, sitting in the movies or shopping in the mall became painful.
The conditioning program I put together for Mary was designed to strengthen the abdominals and the back extensors in order to increase core stability to stretch and strengthen the hip flexors and hamstrings, which can help relieve low back tightness. Mary is aware of the importance of systematic stretching and strengthening of not only the muscles in the back but the other muscles in the body as well. In order to heal, she is learning to listen to her body. While she is doing every exercise, I make sure she is not experiencing any pain otherwise she must stop and find a comfortable resting position. For her conditions I avoid forward bending and all spinal articulation exercises.

Block System, Session 15, Fundamental + level

The Warm Up - on mat modified pelvic curl, supine twist, chest lift and leg changes

Mary enjoys these exercises and they are great for her spinal alignment, lumbar spine control and for lengthening the latissimus dorsi muscles.

Foot work – reformer, foot work series using 2 reds (R) and 1 blue (B) and 2R for singles

The muscles in the calves and the quadriceps are critical to the support of the back. When these muscles are strong they reduce the amount of work required by the back to support the weight of the body. This is noticeable when standing, climbing stairs, getting out of bed in the morning, or getting up after sitting in a chair.

Abdominal Work – reformer - hundred and coordination, 1R

Abdominal muscles are also vital to the health of the spine. Mary is doing all the movements very slowly and smoothly. I wanted to make sure she was not overdoing it, adding
a few more repetitions each session until she built the abdominal muscles up. Again lying supine helps her with pelvic lumbar stabilization.

Hip Work – reformer frog, extended frog forward and reverse 1R1B

Hip work promotes good hip extension and requires correct abdominal engagement as well in order to maintain the neutral pelvis throughout. Increasing range of motion of the lower body will help protect Mary from future low back injuries.

She will avoid the spinal articulation exercises as the forward flexion and extension with rotation can be contraindicated.

Stretches – reformer – standing lunge, kneeling lunge 1R

Stretching elongates and opens up muscle tissues. These exercises are wonderful for stretching both hip flexors and hamstrings and strengthening the quadriceps and back extensors at the same time which may help relieve low back tightness.

Full Body Integration – scooter and elephant 1R

These exercises are so good for Mary. She performs scooter with modification from its flexed position into a neutral spine position. This will avoid further pressure on the discs protrusion while increasing pelvic lumbar stability. Elephant is one of her favorites, excellent for abdominals and back extensors, trunk and shoulder stabilization and additional hamstring and shoulder stretch.

Arm Work – reformer – arm supine series 1R
In supine position Mary can work on her latissimus dorsi and triceps while she is able to maintain a neutral pelvis and contracted abdominal muscles.

Leg Work – mat - magic circle leg supine series

Knees and ankles exercises are very challenging for Mary, they are very powerful and will achieve the desired hip adductor strength while keeping pelvic lumbar stabilization and activating abdominals to protect the lower back.

Lateral Flexion/Rotation – mat - mermaid

Another example of Mary’s favorites because she can get a deep muscle stretch in the lateral trunk flexors and enhance mobility throughout the spine.

Back Extension – mat - swimming, cat stretch

To continue with the flow I choose these valuable exercises to strengthen the back extensors, enhance trunk stability and improve movement coordination. Swimming, once almost impossible to do, Mary has improved so much, she can do it quite easily now.

I believe that by continuing to practice Pilates 2 -3 times a week, having passion and a positive attitude, Mary will improve the alignment of the vertebrae to help prevent the advancement or worsening of disc degeneration.
CONCLUSION

It has been reported that 80% of Americans will experience low back pain and the lifetime prevalence of this, and herniated nucleus pulposis may occur in 25% of those experiencing low back disorders (“LBD”). LBD is multifactorial in origin and may be associated with both work-related and non-work-related factors. These include age, gender, smoking, physical fitness, strength, lumbar mobility, anthropometry, medical history, and structural abnormalities.

This case study shows that the Pilates exercises that I have recommended have significant benefits for Mary.

The key to the positive effects of Pilates lies in its principles and implemented through its exercises and equipment. It is a mind-body system that, unlike many forms of physical fitness, not only addresses the quantifiable aspects of human movement such as strength, range of motion and endurance but also looks at awareness, balance, control, efficiency, function and harmony. In so doing stabilization is developed, posture is refined, mechanics of movement are improved, muscle recruitment patterns are re-educated and function and well-being are reinforced – the ultimate goal of any good conditioning program. Pilates can and will improve every facet of your life.
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