L5-S1 Intervertebral Disc Herniation

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November 2016
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This paper discusses the benefits of using the Basi Block System and how it has helped the client regain functional movement to her body by utilising both Mat and equipment exercises. The client suffered an injury to her L5-S1. She had an intervertebral disc herniation with bilateral nerve root compression (L-R). This paper will walk you through exact locations of the injury, possible causes, and the movement program that was worked through which helped to minimise the pain that the client was in, gave her more movement, strength and flexibility and made day to day tasks more achievable.
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Anatomical overview of the Lumbar spine and Sacrum

The Lumbar spine is located at the lower part of our backs, connecting with the Thoracic spine, and carries on down to the Sacral spine. The Lumbar spine comprises of 5 vertebrae L1-L5. Connecting each vertebra is an intervertebral disc, the annulus fibrous which is the tough, flexible outer ring of fibrous tissue, hold the vertebrae together providing strength and flexibility, whilst the Pulpous, the soft, gel-like material inside the annulus fibrosis. acts as a shock absorber to help with the strain and pressure that’s loaded onto the lower back. This section of our spine is at the lower point on our backs, so in turn, must bear the load of more weight, which is why L1-L5 are the biggest unfused vertebrae in the spinal column, which helps in turn support the weight of the entire torso.

The lumbar spine is extremely strong, it helps protect the spinal cords and spinal nerve roots. It is also highly flexible, helping to provide a range of movements in different planes. Some of these include Flexion, Extension and Rotation.

**L5**-Being the last of the Lumbar Vertebra, is the largest and most inferior. Being the last of the lumbar vertebra also means that it incurs more load of body weight than any other vertebra, which is why L5 is the largest and strongest Lumbar vertebra, but because of this, is also more susceptible to injuries.
Regular Lumbar Spine

ANATOMY OF THE LUMBAR SPINE

L5-S1 Disc From Above

L5-S1 Disc From The Side

Area of Injury

Mid-Sagittal View
Sacrum

The Sacral region is located towards the bottom of the spine it lies between L5 of the lumbar spine and the tailbone. The Sacrum is a triangular shaped bone that consists of 5 segments that go from S1-S5 and are fused together. Each side of the sacrum joins with a hipbone, which is important for the stabilization of the pelvis. Because the vertebrae of the sacrum are fused, it means that most of the movement of the Sacrum occurs more towards the last lumbar vertebra. The joint that is between is named Lumbosacral joint. The movements at this joint have a great effect on our alignment of the lower back and pelvis region.

Why does back pain often occur in L5-S1?

Back pain or leg Pain (Sciatica) can often occur where the Lumbar spine and Sacral region connect (L5-S1), this is because this area of our spine often incurs a lot of stress loaded on from long periods of sitting often with poor posture, also during some activities and sports that involve high impact or extreme amounts of twisting using poor technique.
Case Study

Stacey, 32 years of age, was a very active person taking part in activities such as; tennis, motor-cross, swimming, mountain biking and her biggest enjoyment was running a 10k, which was a part of her weekly routine.

In Stacey’s case she suffered an injury to her L5-S1. She had an intervertebral disc herniation with bilateral nerve root compression (L-R). Nerve root compression is often caused in the lower back due to where the vertebrae supports a lot of the weight and where large amounts of movement occur. Nerve root compression is more likely to occur with Stacey’s injury of an intervertebral disc herniation as these conditions can destabilize the spine.

Non-surgical Treatment for this injury would be utilizing exercises that help strengthen the core muscles better posture, working on flexibility by using correct ways to stretch. Also by using hot and cold therapy to reduce inflammation and muscle spasms. Stacey was seeing a physiotherapist once a week, doing two private Pilates sessions, and also swimming everyday as rehabilitation.

Stacey came to us after incurring an injury in her lower spine. The exact injury was in her L5-S1. She had an intervertebral disc herniation with bilateral nerve root compression (L-R). The injury was likely to have been present up to a year before, being caused by poor posture and a weakened core. Also, whilst enduring pain in her lower back she continued to run up to 10km and carried on with heavy lifting pushing through the pain, only to make her symptoms worse.

Stacey’s symptoms included pain in her Lower Lumbar, mainly present on the left side of her body, which then radiated into her Left buttocks and down the left
hamstring into the calf, and also into the left foot causing weakness and numbness to occur.

When Stacey began taking Pilates, she had very limited movement. Stacey had been given the clear by her physio and that it was ok to begin Pilates classes. Stacey had already been working with the physio for around a month and had stopped all other activities apart from swimming. Stacey had been rehabilitating her injury by doing daily strengthening exercises given to her by her physio, daily swimming, twice a day with heat packs, and began seeing me at the studio twice a week for one on one Pilates mat/equipment classes.

When somebody first comes to the studio after occurring an injury there often afraid to start moving. There is always that fear in their head that by moving they will make their injury worse, which was the same in Stacey’s case. Stacey also knew that it was so important to get the body moving again in the correct way, and in her case it was important to regain the strength through her lower back and also getting the strength back through the left leg and foot.

Stacey’s main goals from taking Pilates classes are to gain more strength, help with relieving some of the pain, and getting the body moving in a more functional way.

During the initial assessment of Stacey’s alignment, postural plumb line deviations of a flat back posture were present and forward head displacement were noted. Suspected imbalances indicative of her faulty alignment included slight weakness in the abdominals, and tightness of the hip flexors and low back extensors. Flat back causes an increased risk of lower back injury as it reduces the normal shock absorbency of the spine.
## CONDITIONING PROGRAM

<table>
<thead>
<tr>
<th>Sessions</th>
<th>1-10</th>
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<th>21-30</th>
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<tbody>
<tr>
<td><strong>BASI BLOCK</strong></td>
<td>Pelvic Tilts</td>
<td>Pelvic Tilts</td>
<td>Mat-Roll up, supine twist, double leg stretch, single leg stretch (or) Cadillic- roll up with roll up bar Mini roll up oblique</td>
</tr>
<tr>
<td><strong>Warm Up</strong></td>
<td>Pelvic Curls</td>
<td>Pelvic Curls</td>
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<td></td>
<td>Leg Lift Supine</td>
<td>Leg Lift Supine</td>
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<td></td>
<td>Spine Twist Supine</td>
<td>Spine Twist Supine</td>
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<td></td>
<td>Chest Lift</td>
<td>Chest Lift</td>
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<td></td>
<td>Chest Lift with Rotation</td>
<td>Chest Lift with Rotation</td>
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<tr>
<td><strong>Abdominals</strong></td>
<td>Hundred Prep-Mat Single leg/changes</td>
<td>Hundred Prep and coordination-reformer</td>
<td>Short box series-Reformer (or) Breathing with push through bar Rollup top loaded-Cadillac</td>
</tr>
<tr>
<td><strong>Hip Work</strong></td>
<td>Leg circles-mat (or) Reformer hip work-frog, circles up and down</td>
<td>Leg circles-mat</td>
<td>Single leg hip work-Cadillac Parallel frog-circles up and down Hip extension and bicycle</td>
</tr>
<tr>
<td><strong>Spinal Articulation</strong></td>
<td>n/a</td>
<td>Avalon – Bottom Lift</td>
<td>Bottom lift plus extension- Reformer (or) Tower prep-Cadillac</td>
</tr>
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<td><strong>Stretches</strong></td>
<td>Standing lunge reformer (or) Pole series</td>
<td>Kneeling lunge-Reformer (or) Ladder barrel-Gluteal, hamstrings, abductors, hip flexors</td>
<td>Standing and Kneeling Lunge-Reformer (or) Ladder barrel-Gluteal, hamstrings, abductors, hip flexors</td>
</tr>
<tr>
<td><strong>Full Body</strong></td>
<td>n/a</td>
<td>Reformer–Up Stretch 1 (or) Scooter</td>
<td>Cadillic- Sitting forward or side reach</td>
</tr>
<tr>
<td><strong>Arms</strong></td>
<td>Reformer– Supine Arm Series</td>
<td>Cadillac-standing arms</td>
<td>Avalon- Sitting arms (or) Cadillac- standing arms</td>
</tr>
<tr>
<td><strong>Full Body</strong></td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Legs</strong></td>
<td>Magic circle-sitting series (or) Gluteal series</td>
<td>Leg press standing-Wunda chair (or) Single leg skating (or) hamstring curl-</td>
<td>Wunda chair- Hamstring curl (or) hip opener</td>
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The basis of the conditioning program was to focus on the following:

1. strengthening the abdominals, especially the transversus abdominis and obliques to increase pelvic-lumbar stability;
2. stretch and strengthen the hip flexors, hamstrings, and glutes;
3. strengthen the spinal extensors of the upper back;
4. stretch the extensors of the lower back to increase mobility.

The first few sessions we spent a large amount of time just focusing on Stacey’s breathing as this will help to facilitate and maintain abdominal contraction once we begin performing the exercises. A huge role in helping her support and strengthen the lower spine was working on her neutral pelvis and finding a deep connection with her transverse abdominis, which will in turn help support her lower back. A lot of time in the first sessions was spent exploring the mat repertoire adding in suitable variations where needed.

The BASI Fundamental Warm Up was chosen for the first 20 sessions. Before beginning the Pelvic curl, we focussed on small pelvic tilts, bringing the pelvis towards the nose and taking it back to neutral, warming up the lower spine. For the Pelvic Curl, the focus was on activation of the pelvic floor, transversus abdominis, and hip extensor muscles for the proper articulation of the pelvis and spine. Spine Twist Supine was chosen for learning spinal rotation while maintaining correct alignment of the core. We modified this with toes on the Mat, keeping the rotation
small to begin with as Stacey did not have the strength to hold legs in table top. Chest Lift and Chest Lift with Rotation offered provided opportunities for Stacey to learn effective abdominal strength and pelvic stability, as well as focusing on obliques with rotation. Once Stacey showed sufficient strength and proficiency with the fundamental warm up exercises, we began the BASI Intermediate Warm Up.

Footwork is a fundamental section of the Pilates workout, it encompasses the whole body, in particular the spine and pelvic position. The Foot Work was introduced on the Reformer to help Stacey gain stabilization of the pelvis and to strengthen and lengthen her hamstrings. We did not add single leg heel or toe on first sessions as Stacey was still weak through her leg and foot. The foot work is so vital, it’s important for hip extensor strength and knee extensor strength. For Stacey, ankle planter flexor strength was important as she was weakened through her left leg and ankle. Foot Work progressed to the Cadillac, where continued emphasis of pelvic-lumbar stability was made.

For the abdominal block, Stacey began with exercises that help to develop core strength and again, focus on stabilizing through the pelvic lumbar. The first sessions comprised of mat exercises which included leg lifts, leg changes and hundred prep (legs down). I felt it was important that Stacey strengthen her abdominals before progressing onto the equipment. The Hundred Prep on the Reformer focused on both abdominal strength and stability. She also practiced the Short Box Series, which offered abdominal engagement in spinal flexion, extension, and rotation. With her continued improvement, we progressed to Breathing with Push Through Bar.
We then moved on to hip work comprising of Leg circles utilising the mat work. As Stacey’s pelvic lumbar stabilization developed, we moved onto the equipment, focusing on the fundamental reformer hip work series before moving into the fundamental Cadillac and single leg intermediate.

In sessions one to ten, the only spinal articulation that was programmed consisted of pelvic curls during the warm up. We focused on Stacey achieving appropriate spinal articulation, avoiding over using her glutes and finding more hamstring control. In later sessions, we added bottom lift on the Avalon, followed by bottom lift and extension on the reformer and tower prep on the Cadillac.

For Stretching, Stacey began on the Reformer with the Standing Lunge which focuses on stretching the hip flexors and the hamstrings. Later, we progressed to the Kneeling Lunge and the stretching series on the ladder barrel which incorporated a gluteal and abductor stretch.

From sessions 11 onwards, I began to add in some full body integration. Starting off with up stretch 1, which focused on the abdominal and back extensors, Stacey’s trunk stabilization began to improve, as well as having more length in her hamstrings. From here we added additional full body integration which included sitting forward and side reach.

In the first few sessions we began the magic circle series- Arms bent, Arms straight, arms overhead, single arm side press, single arm bicep. In later sessions we added in supine arms on the reformer and standing arms on the tower once Stacy’s scapular and trunk stability had improved and then moved onto the Cadillac standing arms series.
The focus of the Leg Work block was on continued strengthening of her weakened left leg which was caused by her bilateral nerve root compression. I had her start on the magic circle sitting series, focusing on trunk stabilization and hip abductor strength. We then added the Hamstring Curl and Single Leg Skating on the Reformer as well as hamstring curl and hip opener on the Wunda chair.

The next sessions with the lateral flexion and rotation was vital as it focused on the oblique muscles, which help to protect and stabilize the core, giving the opportunity to have a trunk lateral flexor stretch. We began with the mat side lifts, and then began to incorporate equipment work such as side over prep on the ladder barrel, and side stretch on the Wunda chair.

Moving onto the back extension, we began with basic back extension by lying prone (not lifting the head up) on the mat, focusing on the engagement of the abdominals and the engagement of the back extensors. In later sessions we added n swan basic on the Wunda chair and breastroke prep on the reformer. It was important that Stacey learn how to engage her abdominals in back extension to help protect the lower back. After back extension, Stacey would pull back into a rest pose, stretching out her lower spine.
Conclusion

Since Stacey has been attending Pilates classes, she has noticed that her everyday movement has become easier and her body is now moving more freely with less pain.

We have moved very slowly, spending a lot of time on the mat repertoire and making sure the movement was precise before we progressed to using the equipment. Stacey has become more aware of her body which in turn has helped her at work, as she is more focused on her posture. Stacey also spends time at home doing some of the fundamental mat exercises and spends time focusing on her breathing, which in turn has helped strengthen her core muscles and has helped to protect her lower back. The way the block system is designed, it has allowed for Stacey to get mobility back into her body, her flexibility has increased and her every day to day life is more enjoyable as the pain has decreased considerably. Stacey is still practicing Pilates and sees it as a vital part of her life now.
BIBLIOGRAPHY


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