The Outcomes Following the Implementation of a Pelvic Floor Contraction with Lumbar Stabilization Exercises for a Patient with Low Back Pain: A Case Report

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**Title:** The Outcomes Following the Implementation of a Pelvic Floor Contraction with Lumbar Stabilization Exercises for a Patient with Low Back Pain: A Case Report

**Background and Purpose:** It has been reported that 80% of people experience low back pain sometime during their lifetime. It has been shown that training the muscles that stabilize the spine can help to reduce pain levels in those who experience low back pain. Muscles that create spinal stability include the deep abdominal stabilizers, such as the transversus abdominus, as well as the muscles of the pelvic floor. The purpose of this case study is to describe outcomes after the implementation of lumbar stabilization exercises performed with pelvic floor contractions for a patient with low back pain.

**Case Description:** The patient was a 58 year old female with a six month history of low back pain. Her pain was located at L3-4 and into her right buttock, and she described it as a dull ache that was sharp at times.

**Outcomes:** At the end of four sessions the patient showed improvements in her hip strength, pain rating, and lumbar stabilization. An Oswestry Disability Index Questionnaire was given to her at the initial evaluation, but because she discontinued therapy after four visits, a final questionnaire was not completed.

**Discussion:** The findings from this case report suggest that including a pelvic floor contraction while performing lumbar stabilization exercises may be beneficial, along with a standard physical therapy program, for improving pain and lumbar stabilization for a patient with low back pain.
Introduction

It has been reported that up to 80% of people experience low back pain (LBP) during their lifetime. 10-40% of these cases become chronic which can create a financial burden because LBP is also the first cause of the inability to work and disability.1, 2

Mechanical stability during dynamic conditions and heavier loads is thought to be provided by the spine and surrounding muscles. The stabilizing system of the spine is made up of three categories: the spinal column, muscles surrounding the spine, and a neural portion. These categories create intrinsic stability, dynamic stability, and a coordinated muscle response respectively.2 When these components do not work together properly, especially the deep stabilizing abdominal muscles, the outcome can be pain and instability. Another contributing factor to LBP are the pelvic floor muscles (PFM).3 The PFM, which include the levator ani and coccygeus, increase intra-abdominal pressure as well as adjust the stiffness of the pelvic ring, therefore providing stability.

Consequently, when the PFM are not strong enough or not performing their actions correctly instability can result, leading to LBP. In a study done by Arab et al.4 the researchers examined the performance of the PFM in 40 women with and without LBP; there were 20 women with and 20 women without LBP. A transabdominal ultrasound was used to assess the displacement of the bladder when the subjects performed a PFM contraction. The results of the study showed a significant decrease in PFM function for women with LBP which, as stated earlier, could be a contributing factor to their LBP.

O’Sullivan et al. (1997) assessed the efficacy of training the deep abdominal muscles in people with LBP.5 The results of their study show a significant decrease in pain and functional disability for those that underwent specific abdominal training. When Neumann and Gill (2002) examined the interaction between the abdominal muscles and PFM using EMG they found that when the PFM were contracted, the transverse abdominis (TrA) and internal oblique muscles were activated as well.6 Thus,
consciously activating the PFM and the TrA can provide better stability to the pelvis and lumbar spine than contracting only one or the other.

Mohseni-Bandpei et al. (2011) looked at the effect of implementing PFM exercises for patients with LBP. 20 women rated their pain, functional disability, and had their PFM strength and endurance assessed using a perineometer. Each woman was then randomly assigned to a control or experimental group. The control group received traditional physical therapy interventions while the experimental group received the same treatment with the addition of a PFM exercise. The women were instructed to perform PFM contractions 6 six times per day progressing to ten times per day. The results showed no significant difference in pain intensity and functional disability between the control and experimental group at the eight week and three month follow-up. However, there was a significant decrease in pain and functional disability within the groups. After obtaining these outcomes, the authors concluded that including a PFM exercise would not be more beneficial than traditional physical therapy for someone with LBP.

To date, there have not been any published studies found that incorporated a PFM contraction while performing abdominal stabilization exercises. Previous studies have assessed the activation of the TrA and PFM, if lumbar stability exercises are beneficial for a patient with LBP, and the inclusion of PFM contraction into the plan of care (POC) for a patient with LBP. 2, 5, 6 Therefore, the purpose of this case study is to describe outcomes after the implementation of lumbar stabilization exercises performed with pelvic floor contractions for a patient with LBP.

**Case Description**

**History**

The patient was a 58 year old female with a chief complaint of LBP that started approximately six months ago. She had no significant findings in her review of systems and could not recall any preceding event to the onset of her symptoms. Her pain fluctuated throughout the day and was located
at L3-4 and in her right (R) buttock. She rated her pain at a 3-4/10 at the time of evaluation, 1/10 at best, and 10/10 at worst. She described her pain as a dull ache that became sharp at times. Standing, bending, and sitting exacerbated her symptoms while lying on her back decreased her pain. Her goal for physical therapy was to stand without discomfort.

**Clinical Impression One**

This patient came to physical therapy with an initial diagnosis of LBP from her primary physician. Based on the subjective interview and the unremarkable review of systems, it was determined that she was appropriate for physical therapy. From the patient’s description and location of pain, a lumbar spine and pelvic examination would be performed to determine the cause of this patient’s pain.

**Examination**

Upon objective testing it was found that the patient had mild forward head posture, her R sacroiliac joint (SIJ) was deep, and her R anterior superior iliac spine (ASIS) was anterior. Her lumbar active range of motion (AROM) was assessed using percent of normal. Bilateral hip strength was assessed with manual muscle testing (MMT). Tables 1 and 2 have summarized results for lumbar AROM and MMT respectively. Positive special tests found for SIJ dysfunction include: the standing forward bend test, sacral rocking, and the march test. Additionally, hypermobility was found with posterior-anterior (PA) joint play at her sacrum. Pain was found with PA joint play at L2-4 and R SIJ. She had 26.66% disability on her initial Oswestry Disability Index (ODI) score.

**Clinical Impression Two**

After reviewing the results of the objective tests and measures it was determined that this patient could benefit from physical therapy. Interventions to be utilized were lumbar stabilization exercises with the addition of a PFM contraction, hip strengthening exercises, and flexibility exercises. Also, due to the restrictions felt with lumbar joint play, joint mobilizations were to be used to increase AROM.
**Intervention**

This patient was scheduled to be seen at an outpatient physical therapy clinic two times per week for eight weeks for 45 minute sessions. The patient was seen for a total of four follow-up visits for lumbar stabilization exercises as well as interventions that targeted her hip strength and lumbar ROM impairments. After four sessions the patient discontinued therapy because she was not able to get time off of work to attend her appointments. Each session included hip strengthening exercises, lumbar joint mobilizations at various grades, and lumbar stabilization exercises.

Lumbar stabilization exercises were started at the patient’s initial evaluation. The first exercise introduced was bridging. For this exercise the patient was in hooklying on a plinth. She was instructed to lift her buttocks off the table into a pain free range. The second exercise introduced was a posterior pelvic tilt (PPT). The patient was in the same position as bridging and was given the cue to flatten in her low back against the table. During this, the student physical therapist (SPT) was palpating for a TrA contraction and had her other hand under the patient’s lumbar region to confirm a PPT was being performed. Since the SPT could not feel a TrA contraction or the patient’s lumbar lordosis reversing, the SPT provided a tactile cue to the patient. The SPT put one hand on each of the patient’s anterior superior iliac spines and performed the motion for the patient. After this cue was given, the patient was able to perform a PPT correctly. Both the bridging and PPT exercises were performed for 2 sets of 10 reps and were given to the patient as a home exercise program (HEP).

At the patient’s first follow-up treatment session, she was instructed to include Kegels with her PPT and bridging exercises. The patient was familiar with Kegel exercises as she had performed them with her pregnancies. To verify the patient was performing Kegels correctly, the SPT asked the patient to describe the feeling she had while performing them; the patient responded that she felt a lifting sensation which confirmed to the SPT that the patient was performing Kegel’s correctly.
As the patient progressed, so did her exercises. An alternating single knee to chest was added to her PPT and Kegel. The bridging exercise was initially progressed by adding an alternating single knee extension; the patient was instructed to bridge, extend one knee, bring it back down, repeat for the other knee, then lower the bridge. The last bridging progression was made by adding external rotation at each hip. The patient would bridge, spread her knees apart five times, and then lower the bridge; this was considered one repetition. Each exercise was performed for two sets of 10 reps.

**Outcomes**

In the 4 sessions the patient attended, improvements were made. At the initial evaluation, she was given PPT and bridging to perform. At the fourth session she was able to maintain a PPT while performing an alternating single knee to chest. She was also able to perform bilateral hip external rotation during a bridge. At her first follow-up session, clamshell exercises were given that were progressed to using a green theraband wrapped around her distal thighs. These progressions show that she was gaining strength and lumbar stabilization throughout her short duration of therapy.

Her pain report using the numeric pain rating scale was rated at a 10/10 at worst at the initial evaluation, and by her last visit she rated her worst pain at a 7/10. She was also complaining of less tenderness of the L2-4 spinous processes at her fourth visit. When joint play was assessed at the third visit, she did not mention pain with PA pressures to the R SIJ nor at her sacrum whereas at the initial evaluation she had pain with joint play at those levels.

The patient canceled her remaining follow-up visits (numbers 5-8) over the phone with the clinic’s receptionist. The patient gave the reasoning that she was not able to make the sessions due to work. For this reason, the patient was not given a final ODI. An attempt was made to mail her an ODI questionnaire, but there was no response.

**Discussion**
The research to date has not examined the effects of including a PFM contraction while performing lumbar stabilization exercises for a patient with LBP, therefore the purpose of this case study was to describe outcomes after the implementation of lumbar stabilization exercises performed with pelvic floor co-contractions for a patient with LBP. Adjunct interventions included hip strengthening exercises, flexibility exercises, and lumbar joint mobilizations. After four follow-up sessions the patient showed improvements in her deep abdominal stabilization, hip strength and in her pain rating.

Incorporating abdominal stabilization exercises into this subject's interventions was based on the results of a study written by O’Sullivan et al. They found that including spinal stabilization exercises into the POC for patients with spondylolysis and spondylolisthesis can significantly reduce pain and functional disability. The authors included subjects who were diagnosed by their medical doctor as having spondylolysis or spondylolisthesis; they were then randomly assigned to a control group or a specific exercise group. The control group performed a general weekly exercise program prescribed by their medical practitioner whereas the specific exercise group performed an abdominal drawing in maneuver which was later incorporated into daily activities. The investigators found a significant difference between groups post-intervention as well as at a 30 month follow-up visit.

Even though the patient in this case report did not have a diagnosis of spondylolysis or spondylolisthesis, she did present with hypermobility and pain in her lumbar spine and pelvis which lead this author to believe there was a need for stabilization exercises. This current case further differs from the O’Sullivan article because the patient performed a PPT instead of the abdominal drawing in maneuver.5

The current trend for treating a patient with LBP is retraining the TrA initially because of its stabilization properties, but it is still important to include the remaining abdominal muscles in order for the patient to return to normal functioning according to Urquhart et al.11 It was discovered that performing an inward movement of the lower abdominal wall had the most activation of the TrA when
compared to an inward movement of the lower and upper abdominal wall, abdominal bracing, and a PPT. However, during a PPT there was not a significant difference in the TrA activation when compared to an inward movement of the lower abdominal wall, but there was a more evenly distributed muscle activation of all abdominal musculature; this shows that a PPT is a better exercise to collectively activate the abdominals which will help establish normal function and stabilization.

To enhance the stabilization of the current patient’s lumbopelvic region, a PFM contraction was included while performing stabilization exercises. In an article by Neumann and Gill, they found that when a PFM contraction occurred, the abdominal wall muscles were activated as well. Richardson et al. found that a contraction of the transversely oriented muscles, such as the coccygeus, have a great impact on SIJ stability. Through these muscle activations, the PFM are said to have an important role in spinal and pelvic stability.

The ODI was used as an objective outcome measure because it has been shown to be valid and reliable measure to determine the disability a person with LBP is experiencing. The questions on the ODI were based on self reports from patients who presented with back pain; the patients were asked what activities were disrupted by their back pain. It was found in an article by Roland and Fairbank that the ODI may be more suited for someone with chronic severe disability. This differs from the patient in the present study because she did not report that she was experiencing severe disability in the initial evaluation. The Roland-Morris Disability Questionnaire is better suited for someone with mild to moderate disability. The ODI was given to this patient because that is what the clinic utilized for a LBP outcome questionnaire.

Limitations of this study include the inability to use electromyography (EMG) to determine if the patient was properly performing the stabilization exercises as well as the Kegels. Many individuals perform Kegels incorrectly even with the proper cueing, so this author cannot be fully confident that this patient was contracting her PFM. Also, the TrA is a difficult muscle to contract, and without the use of an
EMG, it is hard to determine if a correct contraction was achieved. Lastly, this patient discontinued therapy after four sessions which means she may have had greater improvement if she had completed therapy.

Further research needs to utilize a larger population to examine the effects of including a PFM co-contraction while performing lumbar stabilization exercises. In addition, most of the studies cited in this study have used women as their target population; men should be included in future studies in order to expand the generalization of the theory. Women who have and who have not been pregnant should also be included in future research. Lastly, future researchers should determine the most beneficial stabilization exercise(s) to use in their study in order to achieve the maximum outcomes.

**Conclusion**

In conclusion, including a PFM contraction to lumbar stabilization exercises may be a beneficial addition to physical therapy for someone with LBP. Research has shown that the PFM provide stability to the pelvis and lumbar spine and when the PFM are not functioning correctly, they can cause pain and instability.\(^3\),\(^4\) The patient in this case report showed improvement in her pain rating, lumbar stability, and hip strength after four sessions of physical therapy that included a PFM contraction with lumbar stabilization exercises.
### Table 1

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<td>Rotation Right</td>
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### Table 2

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<tr>
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<tr>
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<td>5/5</td>
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