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Zachary Chaloner
University of New England

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1 **Use of Core Stabilization Exercise and Medical Exercise Therapy in**
2 **the Treatment of a Patient with Chronic Post Partum Low Back**
3 **Pain: A Case Report**

4 **Zach Chaloner**

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6 Z Chaloner, BS, is a DPT student at the
7 University of New England, 716 Stevens Ave. Portland, ME 04103
8 Address all correspondence to Zach Chaloner at: zchaloner@une.edu

9
10 The patient signed an informed consent allowing the use of medical information and video
11 footage for this report and received information on the institution's policies regarding the Health
12 Insurance Portability and Accountability Act.

13
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16 photography.

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23 Abstract:

24 **Background and Purpose:** Low back pain and lumbar hyper-mobility are common during and
25 after pregnancy.¹⁵ Postpartum low back laxity can contribute to LBP and can become chronic if
26 not addressed. Core stabilization exercises (CSE) have been shown to improve function and
27 reduce pain in patients with nonspecific chronic low back pain due to lumbar instability.⁵
28 Additionally, Medical Exercise Therapy (MET) has shown good outcomes in reducing pain in
29 patients with LBP⁷ but has not been thoroughly investigated in the treatment of chronic post
30 partum LBP. There is limited research reporting the use of a combined treatment protocol
31 utilizing CSE and MET in the treatment of chronic low back pain in post-partum women.

32 **Case Description:** The patient was a 28-year-old female with bilateral hip and lumbosacral pain
33 2 years post partum. Intervention consisted of core stabilization exercise (CSE) using medical
34 exercise therapy (MET) and manual lumbar traction. Outcome measures included the Lower
35 Extremity Functional Scale (LEFS), Patient Specific Functional Scale (PSFS), and Numeric Pain
36 Rating Scale (NPRS).

37 **Outcomes:** Results from initial evaluation to discharge (Lower Extremity Functional Scale
38 (LEFS) – 48/80 to 62/80; Patient Specific Functional Scale (PSFS) – 4/10 to 7/10; Numeric Pain
39 Rating Scale (NPRS) – 7/10 to 4/10) demonstrated decreased pain, increased ability to return to
40 prior level of function, and improved ability to take care of her two-year-old daughter.

41 **Discussion:** Low back pain after pregnancy can be difficult to manage. This case report
42 demonstrated a combined intervention of CSE and MET decreased pain and increased function
43 in a 28-year-old female presenting with post-partum LBP. Future studies should investigate the
44 combined effects of CSE and MET in a larger population of patient with LBP.

45 **Manuscript word count:** 3291

46 **Background:**

47 Low back pain (LBP) is a common and debilitating condition, with a quarter of U.S. adults
48 reporting an incidence of back pain over a 3-month period.¹ LBP has been reported as the
49 leading cause of activity limitation and work absence in a large part of the world.² Lumbar low
50 back pain and posterior pelvic pain are common during and after pregnancy,³ with almost a third
51 of pregnant women reporting back pain throughout their pregnancy and almost one fifth
52 reporting pelvic pain.⁴ Research has found that lumbar spine pain and posterior pelvic pain, that
53 often occurs during pregnancy, must be treated with different types of interventions in order to
54 effectively reduce the pathology. In 30-35% of patients, lumbar spine pain has been found to be
55 caused by hypermobility at the the vertebral segments.⁵

56 Core stabilization exercises (CSE) are common in the treatment of low back pain and have
57 been shown to be more effective than conventional exercise in reducing pain.⁶ The development
58 of this pain is debilitating and can potentially have affects on a woman's ability to function in her
59 daily life.³ In patients presenting with hypermobility in the lumbar spine, which is causing
60 chronic low back pain, research has found that CSE in combination with general exercise can
61 improve instability at those joints.⁵ In one study, 47% of pregnant women experienced low back
62 pain during pregnancy, and by participating in a program that included education and exercise,
63 reduced back pain and as a result sick leave by 43 weeks.³ Research is limited on an effective
64 treatment program to treat chronic low back pain that occurs either during or after pregnancy.
65 Core stabilizations exercises, however, have been demonstrated to reduce low back pain in
66 multiple populations.⁶

67 Medical Exercise Therapy (MET) was developed in the 1960s in Norway and has become a
68 well recognized treatment approach in parts of Europe and North America.⁷ MET uses specially

69 designed equipment in order to grade exercises and treat a patient's condition specifically based
70 on their dysfunction. The approach consists of 7-10 exercises, designed to treat a pathology
71 globally, semi-globally, and locally. Global exercises are designed as broader exercise that treat a
72 patient's whole body. Semi-global exercises are those which treat the entire affected limb, while
73 local exercises are specific to the affected joint or area experiencing pain or dysfunction. In a
74 complete program, a patient may be performing 1000 repetitions of exercise in one, sixty-minute
75 therapy session.

76 While research is limited on the effects of MET on LBP, some studies have shown it to be a
77 good alternative to conventional physical therapy. In one study comparing the efficiency and
78 costs of MET to conventional therapy and self-exercise in the treatment of LBP, MET was found
79 to have the highest patient satisfaction across all three therapies.⁸ While costs were not reduced
80 to the same extent as conventional therapy, MET appears to be a good alternative, that with
81 higher satisfaction, patient's may be more likely to complete therapy. While there is limited
82 research showing the most effective treatment for LBP, MET has been shown to effectively
83 reduce pain, increase function, and reduce medical costs.⁸ While there is research that supports
84 the use of both CSE and MET in the treatment of LBP, research is limited on the efficacy of a
85 combined treatment of the CSE and MET in the post-partum LBP population.

86 **Purpose:**

87 The purpose of this case report was to investigate a combined physical therapy treatment
88 protocol of CSE and MET on a patient with chronic low back pain 2-years post-partum.

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91

92 **History:**

93 The patient was a 28-year-old female who presented with bilateral posterolateral hip and
94 lumbosacral pain, which began post-partum approximately two years prior. The patient had no
95 prior pregnancies or episodes of LBP; however, she did report a coccyx fracture during her home
96 birth delivery. The patient reported that she was breast feeding and had a 2 ½ cm diastasis recti at
97 time of initial evaluation. The patient had, had no previous physical therapy treatment for this
98 condition, but reported occasional massage, which tended to make the condition worse.

99 The patient was in good physical condition and reported that she enjoyed exercising 4-5
100 times per week, which consisted of running, biking, or yoga. However, since her pain had been
101 getting worse, she was unable to participate in those activities. She also reported that she was
102 unable to stand longer than one hour without pain, sit for greater than 10 minutes without pain,
103 had difficulty squatting, and had difficulty lifting heavy objects, such as her daughter or
104 groceries, from the ground. Pain in her low back and hips was also preventing her from fully
105 caring for her two-year-old daughter, however, she had support from her mother when needed to
106 help with childcare.

107 At initial evaluation, the patient was found to have a 50% reduction in lumbar extension
108 active range of motion (AROM), excessive hip external range of motion (ROM) and limited
109 internal ROM in her right hip. Patient presented with increased mobility at the L5-S1 segment in
110 her lumbar spine and expressed relief of symptoms with unloading of the lumbar spine. Detailed
111 information on results from the systems review can be found in Table 1.

112

113

114

115 **Clinical Impression #1:**

116 The patient was a 28-year-old female presenting with the health condition lumbar
117 instability at the L5-S1 segment and decreased flexibility in bilateral hip flexors, and bilateral
118 iliotibial bands. At the impairment level, the patient presented with lumbosacral pain resonating
119 into bilateral hips with pain in her right hip greater than her left. Pain in this region was
120 decreasing the patient's ability to perform activities of daily living, squatting, sitting for extend
121 periods of time, running, and yoga. Pain also restricted the patient from participating in caring
122 for her daughter and participating in recreational activity. Patient environmental factors included
123 biking and driving (extended sitting) as modes of transportation and necessity of caring for her
124 daughter in her home.

125 Based on the symptoms that the patient presented with during the initial evaluation it was
126 determined that sacroiliac dysfunction, lumbar disc herniation, hip joint dysfunction, and sciatic
127 nerve inflammation were all potential differential diagnoses with this case. Further information
128 regarding birth history and status of diastasis recti was needed. Family medical history was
129 thought to be insignificant but the patient was unsure of any relevant conditions.

130

131 **Examination & Evaluation:**

132 Pertinent information was gathered from the patient's verbal medical history as to inform
133 the clinician of what impairments may be relevant to the patient's condition. The patient
134 completed 2 self report outcome measures, the Lower Extremity Functional Scale (LEFS), and
135 the Patient Specific Functional Scale (PSFS) as well as reporting her pain on the Numeric Pain
136 Rating Scale (NPRS) at best, worst, and present. The LEFS has been found to be a reliable and
137 valid tool in assessing function in people with various lower extremity pathologies.⁹ Scores range

138 from 0-80 with the score out of 80 being the percentage of perceived function in a patient's
139 lower extremity. The minimal clinically important difference has been reported as a difference of
140 9 points in various lower extremity pathologies.⁹ The patient initially scored 48/80 on the LEFS,
141 which suggested that the patient was at 60% of normal lower extremity function. The PSFS is
142 self reported measure of a patient's perceived ability to complete specific activities. It has been
143 found to be a reliable and specific tool in determining clinically important change in chronic low
144 back pain.¹⁰ Using the scale, the patient rates their ability to perform a certain activity on a scale
145 of 0-10, with 0 being unable to perform, and 10 able to perform at prior level. Initially the patient
146 scored a 4/10, which suggested the patient had moderate difficulty performing activity. Items
147 included in this score were squatting, lifting a heavy object from the floor, and ability to stand
148 for 1 hour.

149 Examination of the patient's lumbar active range of motion revealed a 50% reduction in
150 extension ROM. This reduction in range of motion could have been due to hip flexor tightness
151 causing the patient's pelvis to be pulled out of proper alignment. Without proper alignment the
152 patient might have been in poor posture when performing functional activity, thus restricting her
153 lumbar extension ROM. Since the patient reported increased symptoms when in lumbar
154 extension, the manual unloading test was performed, which was positive, suggesting the patient
155 had a load sensitivity.

156 The patient's segmental mobility was evaluated in sidelying with the clinician noting
157 hypermobility at the L5-S1 segment, all other lumbar segments were normal. Hypermobility at
158 the L5-S1 spinal segments could have been due to a multitude of factors including the patient's
159 pelvic alignment and poor postural deviations. Also, laxity in the joint could have been due to
160 higher levels of the hormone relaxin during and after pregnancy.¹¹

161 The patient's hip flexor and iliotibial band flexibility was tested, which were both
162 positive for restriction. This could have been due to the patient's activity level as well as any
163 form of compensation the patient was making due to the patient's abnormal pelvic alignment.
164 Since the patient's lumbar spine was hypermobile, muscles could have been compensating by
165 tightening in order to create stability at the hypermobile segments.

166 Neurological testing was performed in order to rule out any underlying neurological
167 pathology that could be contributing to the patient's symptoms. The patient underwent slump
168 testing, and presented with positive left and right slump tests. These tests suggested nerve root
169 irritation.

170

171 **Clinical Impression #2**

172 Based on patient's objective findings of a hypermobile segment at L5-S1, positive right
173 slump testing and straight leg raise testing, the patient presented with signs and symptoms
174 consistent with lumbar nerve pathology that potentially caused bilateral hip pain and SI joint
175 pain. Based on the patient's prior level of function, motivation, age, and examination data, the
176 patient was a good candidate for Physical Therapy. Prior to coming to physical therapy the
177 patient was living an active lifestyle, participating in sports and recreation as well as caring for
178 her 2-year-old daughter. The patient also had prior knowledge of anatomy and physiology with a
179 degree in exercise science. This further improved her probability of success in physical therapy
180 because of a better knowledge of her own anatomy and physiology. Based on examination
181 findings, the patient was a good candidate for physical therapy and a core stabilization/exercise
182 program was initiated including postural retraining, strengthening, and stretching. All exercises
183 were based on the MET philosophy with low weight and high repetitions in order to decrease

184 pain and return the patient to normal function. Patient continued to be appropriate for the case
185 due to presenting diagnosis and potential benefits and advancement in the use of a core
186 stabilization program for the treatment of chronic low back pain using MET. Patient underwent
187 10 weeks of core stabilization training including strengthening, stretching, and postural
188 retraining using the MET framework. The plan included lumbar traction and massage of the
189 lumbar paraspinals and SI joint region as indicated. Pain assessment was performed using the
190 NPRS at each visit in order to assess patient's pain level during functional activity. Mobility at
191 the L5-S1 segment level were reassessed every 3-4 weeks including palpation of the lumbar
192 paraspinals and SI joint region for assessment of tenderness to palpation. The LEFS and PSFS
193 were used as outcome measures at initial evaluation and discharge in order to determine change
194 in patient functional level during the course of treatment. Slump testing was reassessed at 8
195 weeks after start of care to determine radicular symptoms of the L5-S1 nerve root segment after
196 treatment. Lumbar extension measures were assessed at 4-week intervals in order to assess
197 patient functional range of motion during daily tasks.

198

199 **Interventions:**

200 **Coordination, Communication, Documentation:** The patient was instructed on exercises by
201 the student physical therapist, physical therapist, and trained exercise technicians. Posture and
202 form during exercise were monitored by physical therapists and exercise technicians at the clinic.
203 The patient was seen through direct access and no other clinicians were seen at the time of
204 evaluation. Initial evaluation and daily notes were prepared and documented using InsightEMR
205 throughout the course of treatment.

206 **Patient/client-related instruction:** The patient was verbally instructed on self traction
207 techniques that she could perform at home following two sessions of intervention. She was
208 verbally given a home exercise program at three weeks after initial evaluation. The patient was
209 instructed on lumbopelvic rhythm strategies and functional pelvic alignment for when she was
210 planning on sitting for prolonged periods of time. Patient was advised to hold off on any activity
211 (biking, running, hiking) that exacerbated her symptoms until three weeks after start of care. At
212 three weeks, the patient was instructed to complete exercise sessions of her normal activity if she
213 reported decreased pain on the NPRS. A written home exercise program (HEP) was not given to
214 the patient until six weeks after initial evaluation due to therapist preference in assessing the
215 patient's response to treatment in the clinic. The HEP consisted of instruction on proper
216 strategies when lifting her daughter and exercise instruction related to her program in the clinic.
217 Patient was asked to perform the HEP one time outside of therapy if she had therapy twice that
218 week.

219

220 **Procedural Interventions:** The intervention consisted of 60 minute sessions, two visits per
221 week, for 10 weeks of CSE, MET, neuromuscular re-education, manual therapy, and joint
222 mobilization. CSE has been found to be more effective in reducing pain and disability and
223 improving functional status than conventional exercise.⁶ The MET treatment philosophy focuses
224 on areas of pain and disability with high repetition and low weight training exercises. This
225 promotes the release of endogenous opioids in the brain, which modulate pain perception and
226 allow for increased tolerance to exercise.⁷ Prior research has also found MET reduces pain and
227 improves function in patients with multiple musculoskeletal disorders.⁷ Interventions focused on
228 patient goals and impairments that were found during her initial evaluation. CSE and MET were

229 used to address limitations in range of motion and instability found in the patient's low back and
230 lower extremities. Weight increases for core stabilization exercises were made based on patient
231 tolerance to exercise and her ability to complete three complete sets without increase in
232 symptoms. As patient strength increased during intervention, increases in weight allowed the
233 patients core to be further challenged. Exercises were added to the program when the patient's
234 tolerance to exercise was increased and pain was not present during any of the exercises.
235 Additional exercises were meant to challenge the patient's core and increase stability at the
236 lumbosacral junction. Massage was used during the patient's program when she complained of
237 increased pain at the SI joint and sacrum, which prevented her from fully participating in therapy
238 on a given day. Similarly, stretching was used, in order to decrease pain, when the patient
239 complained of pain or tightness at the insertion of the hip flexor at the lesser trochanter of the
240 femur. Finally, as the patient progressed through her program, treadmill running was used as a
241 test to assess the ability of the patient to maintain pelvic alignment during functional activity.
242 Further detail on exercise frequency, duration, and description can be found in Appendix A.

243

244 **Outcomes:**

245 Results from this study showed improvement in pain, function, and AROM. The patient
246 improved in the LEFS, PSFS, and NPRS with results from initial evaluation to discharge
247 including 48/80 to 62/80, 4/10 to 7/10, and 7/10 to 4/10 respectively. Patient also reported that
248 on some days, at best she had no pain at rest on the NPRS. The patient also demonstrated
249 increased lumbar extension ROM from initial evaluation to discharge from 50% of full ROM to
250 80% of full ROM. Slump testing and SLR testing were both negative at discharge suggesting
251 increased stability at the lumbosacral junction, no longer causing radicular symptoms. With

252 decreased pain and increased mobility, the patient reported increased ability to care for her
253 daughter as well as sitting for 20 minutes without pain when driving. About half way through her
254 time in physical therapy, the patient reported that she was able to bike to her sessions due to
255 decreased pain in her daily life. This demonstrated increased ability to participate in functional
256 activity and progress towards patient goals in therapy. Details on tests and measures performed
257 during examination and at discharge are shown in Table 2.

258

259 **Discussion:**

260 Excessive lumbar translation has been shown to be a cause of chronic low back pain.¹²
261 Previous studies have suggested that CSE in combination with general exercises improved
262 excessive lumbar segmental translation.⁵ The combination and effects of CSE and MET, has not
263 previously been documented in a patient with postpartum LBP. Throughout the course of
264 treatment, the patient's pain and functional ability was variable as she went through her program.
265 Strategies for lifting and functional pelvic alignment, appeared to improve her ability to function
266 as the primary caregiver for her daughter and her ability to perform ADLs. The patient was also
267 able to return to recreational activity on a more consistent basis, and about six weeks into her
268 treatment, was able to bike to and from sessions with limited pain. In addition, throughout her
269 treatment, manual lumbar traction provided the patient with pain relief. Manual lumbar traction
270 is used widely among physical therapy practice but the efficacy of its use has been questioned by
271 multiple studies. Previous research has reported that of 1000 physical therapists in the United
272 States 76% had reported using traction.¹³ This suggests that even with limited efficacy for it's
273 use, many patients respond positively to the intervention, as our patient did throughout her
274 treatment.

275 A factor that was not fully considered throughout the course of treatment was instability.
276 While core stabilization improved the patient's function, suggesting a possible improvement in
277 stability at the L5-S1 segment, at discharge the patient still had complaints of pain and disability.
278 Since the patient had not returned to her baseline level of function, these findings suggested the
279 possibility of extraneous factors affecting her condition.

280 Previous research has found that 67% of women reported low back pain immediately
281 following birth and 37% reported low back pain during the first year after pregnancy.¹⁴ The
282 patient presented with a multitude of factors that could have been contributing to her chronic
283 LBP including, a traumatic birthing process and the presence of a two centimeter diastasis recti.
284 Posterior pelvic pain and low back pain were not differentiated in this case, and have been
285 suggested that assessing these two conditions separately is essential in treating pregnant and
286 postpartum women.³ Without this differentiation, the full scope of dysfunction may not be
287 recognized, and women who are treated for low back pain may get worse.

288 In this case, the combination of CSE and MET with additional lumbar traction, demonstrated
289 improvement in the patient's medical status from initial evaluation to discharge. Decreased pain
290 and increased function at discharge, suggests that CSE and MET in combination may be able to
291 successfully treat chronic LBP in a postpartum woman. Using a similar model in clinical practice
292 may benefit those who are not responding to a conventional exercise program to treat chronic
293 LBP.

294 In conclusion, it is important to consider patient medical history, prior level of function, and
295 differential diagnosis when treating patients with chronic low back pain. It is also important to
296 consider etiology of the possible disorder as well as what events may have led to the onset of
297 disability. Without, these considerations, underlying pathology may be missed and a patient may

298 not successfully reach their baseline level of function through treatment. Ultimately, this case
299 demonstrated that the combined use of CSE and MET was 80% successful in reducing pain and
300 improving function in a 28-year-old woman with chronic postpartum low back pain. Since there
301 is limited research supporting the efficacy of a combined treatment, future studies should
302 investigate the combined effects of CSE and MET in a larger population.

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System	Impairment
Cardiovascular/Pulmonary	Normal
Musculoskeletal	<p>Lumbar Active Range of Motion – Lumbar extension ~50% of normal (Normal range: 3-49°); All other Lumbar Active Range of Motion – Within Functional Limits</p> <p>Hip Active Range of Motion – Within Functional Limits</p> <p>Hip Passive Range of Motion – Slightly excessive Hip External Rotation Range of motion noted in the right hip and decreased internal rotation range of motion noted in the right hip</p> <p>Hip Flexibility – Restricted motion noted in the Hip Flexors and Iliotibial Band of bilateral lower extremities and restriction noted in the piriformis of the right lower extremity. Gastrocnemius, soleus, hamstrings, quadriceps were all within normal limits of flexibility in bilateral lower extremities.</p> <p>Lumbar Segmental Mobility – Slightly increased movement noted with PIVM of the L5-S1 segment. All other segments L1-L5 were within normal limits.</p> <p>Joint Integrity Testing of the Lumbar Spine – Manual traction of the lumbar spine was performed, which alleviated the patient's symptoms.</p> <p>Tenderness to palpation was noted at the sciatic notch, right SI joint, and in the L5-S1 region.</p>
Neuromuscular	<p>Achilles tendon reflex testing (S1) – Normal (2+)</p> <p>Patellar tendon reflex testing (L4) – Normal (2+)</p> <p>Lower extremity sensation – Normal</p> <p>Lower extremity myotomal testing – Normal</p> <p>Neural Tension testing of the Sciatic Nerve – Negative</p>
Integumentary	Normal
Communication	Appropriate
Affect, Cognition, Language, Learning Styles	Patient was a happy 28-year-old English-speaking female with no limitations in cognition. Learning style – patient preferred pictures and demonstration.

Table 2: Test & Measures and Outcome Measures at Initial Evaluation and Discharge

Tests & Measures	Initial Evaluation Results	Final Results
Lower Extremity Functional Scale (LEFS)	48/80	62/80
Patient Specific Functional Scale (PSFS)	4/10	7/10
Hip Scour Test	Negative	Negative
Slump Test	Right Slump Test – Positive with dorsiflexion and cervical flexion on the right. Left slump test – positive with dorsiflexion and cervical flexion on the right.	Negative
Flexion Abduction External Rotation Test (FABER)	Negative	Negative
Straight Leg Raise	Positive – patient reports slight increase in symptoms with straight leg raise testing.	Negative
Numerical Pain Rating Scale (NPRS)	Pain at present – 3 Pain at best – 3 Pain at worst - 7	Pain at best - 0 Pain at worst - 4

Appendix A: Exercises & Interventions

Intervention	Description
Wide grip pull down	The patient was standing with neutral pelvic alignment and with a slight angle to the pull down bar. A pull-down bar was set-up so that the patient's arms were fully extended when holding onto the bar. The patient held the bar with hands gripped distal to the bend in the pull-down bar and pulled the bar to the top of the chest
Rows	Patient was standing with neutral pelvic alignment. Pulleys with two handles were set-up in front of the patient with the top of the pulley at about shoulder height. The patient then brought the pulleys in towards their chest with thumb-up hand positioning squeezing their rhomboids and middle traps.
Bridge	The patient was instructed to lie supine on a mat table in hooklying. They then were instructed to raise their buttocks 4-6 inches off the table squeezing their glutes taking two seconds to ascend and 1 second to descend back to the table.
Golf Stabilizations	The patient was standing with neutral pelvic alignment. The patient was instructed to stand facing a single handhold on the pulley system, which was set-up at about shoulder height. The patient was then instructed to hold the pulley out from the pulley system with about 110 degrees of elbow flexion and rotate their upper body on their hips keeping their hips square. This was repeated facing both directions.
Squats	Two 10-pound weights were set up on a step stool as to imitate the height of the patient's daughter. The patient was instructed to stand with legs 3-4 inches wider than shoulder width and feet pointed at about a 45 degree angle outward (sumo squat). The patient was then instructed to squat down and pick up the 10 lb weights then stand back up, bending knees as to not allow the knees to pass over the toes and keeping the back in neutral alignment throughout the motion.
Planks	Prone in front of a mirror, the patient was instructed to rise up on forearms/elbows and toes while maintaining a neutral spine and neutral pelvic alignment.
Dead Bugs	The patient was instructed to lie supine in front of a mirror. With knees and hips flexed to a 90°-90° position as well as arms at 90° of flexion, the patient was instructed to extend the hip and knee of the R leg and fully flex the L arm then repeat that on the opposite extremities. The arms and legs did not contact the ground throughout the range of motion.
Bird/Dogs	In quadruped, the patient was instructed to straighten opposite arm and leg (R Arm, L leg) slow and controlled while maintaining a neutral pelvis with minimal hip rotation.
Standing Hip Extension	The patient was standing leaning against a mat table with back in neutral alignment and about 90° of hip flexion. The patient was then instructed to bend the R knee to 90° and bring the thigh straight back as to contract the R glutes and hamstrings. This was then repeated on the L side.
Joint Mobilization: Manual Traction	The patient was in hooklying on a plinth or high-low table. The therapist then straddled the table with buttocks at the edge of the patient's toes. A mobilization strap was then wrapped around the midline of the therapist's scapulas and then around the upper calves of the patient with the therapist's hands between the belt and the calves. The therapist then applied grades 2-4 traction of the patient's lumbar spine by extending back into the belt.
Manual Therapy: Hip Flexor Stretching	The patient was placed in supine with their left leg and foot on the ground off the side of a high-low table. The back of the high low table was then raised about 4-5 inches placing the patient's hip in slight extension. The therapist then applied pressure to the ischial tuberosity of the right ischium as to tilt the pelvis posteriorly. The right knee was then bent until the patient described a mild to moderate stretch without any pain.
Sacro-Iliac Joint (SIJ) Gapping	The patient was prone on a high-low table with their face in a face cutout. Using their left thumb, the patient applied pressure to each SI joint and increased pressure by using the R hand as to gap the SI joint with grade 2-3 mobilizations.
Manual Therapy: SIJ/Sacrum Massage	The patient was prone on a high-low table with their face in a face cutout. Using their left thumb the therapist applied a soft tissue massage and pressure to the muscles of the low back and sacrum in a direction parallel to the fibers of the lumbar paraspinals.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9
Wide Grip Pull Downs	Day 1: 1x40 20# Day 2: 3x30 20#	3x30 20#	3x30 20#	3x30 20#	Day 1: 3x30 20# Day 2: 3x30 25#	3x30 25#	3x30 25#	3x30 25#	3x30 25#
Rows	Day 1: 1x40 12# Day 2: 3x30 12#	3x30 12#	3x30 12#	3x30 14#	3x30 14#	Day 1: 3x30 14# Day 2: 3x30 16#	3x30 16#	3x30 16#	3x30 16#
Bridge	Day 1: 2x20 BW* Day 2: 3x20 BW	3x20 BW	3x20 BW	3x20 BW	3x20 BW	3x20 SL*/BW	3x20 BW	3x20 BW	3x20 BW
Golf Stabilizations	Day 1: 1x40 4# BL Day 2: 3x30 4# BL	3x30 4# BL	3x30 4# BL	3x30 6# BL	3x30 6# BL	3x30 6# BL	Day 1: 3x30 6# BL Day 2: 3x30 8# BL	Day 1: 3x30 8# BL Day 2: 3x30 6# BL	3x30 6# BL
Straight Bar Stabilizations	Day 1: 1x40 10# Day 2: 3x30 10#	3x30 10#	3x30 10#	3x30 15#	3x30 15#	3x30 15#	3x30 20#	3x30 20#	3x30 15#
Manual Traction: Lumbar	10 mins	10 mins	10 mins	10 mins	Day 1: 10 mins Day 2: 15 mins	Day 1: 10 mins Day 2: 12 mins	10 mins	10 mins	10 mins
Squats			Day 1: 2x10 20# Day 2: 3x10 20#	Day 1: 3x10 20# Day 2: HELD	3x10 20#	3x10 20#	3x10 20#	3x10 20#	3x10 20#
Planks				Day 2: 10x10 secs	10x10 secs	Day 1: 10x10 secs	3x30 secs	Day 1: 4x30 secs Day 2:	5x30secs

						Day 2: 3x30 secs		5x30secs	
Manual: Prone Hip Flexor Stretch					Day 2: 4x30secs	5x30secs	5x30secs	Day1: 5x30secs Day 2: HELD	HELD due to time
Dead bugs							3x15 BL	3x15 BL	Day 1: 3x15 BL Day 2: HELD
Standing Hip Extension									Day 1: 2x20 BL Day 2: HELD
Bird/Dogs									3x15 BL
HEP Instruction		Day 2: self traction	Day 2: Squats w/ daughter, bridging, self traction		Day 2: self hip flexor stretching	Day 2: Planks		Day 2: WGPD RTB, Rows RTB, GS RTB, Dead bugs	Full program performed at gym – see Appendix A.
Treadmill						Day 1: 7 mins at 5mph Day 2: 10 minutes at 5mph			
Joint Mobilization		Day 2: L SIJ, Sacrum							
Massage		Day 2: BL SIJ, Sacrum							



Figure 1: Squats



Figure 2: Rows



Figure 3: Golf Stabilizations

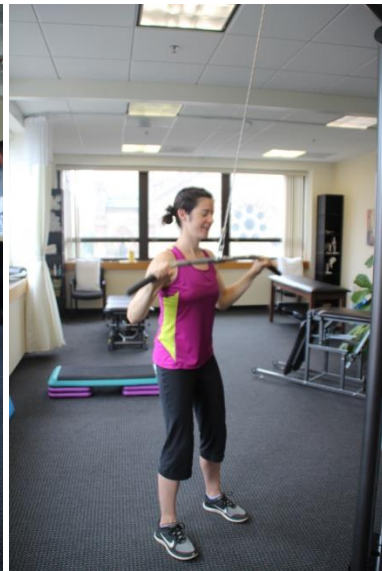


Figure 4: Straight Bar Pull Downs

Appendix B: Outcome Measures

Lower Extremity Functional Scale

We are interested in knowing whether you are having any difficulty at all with the activities listed below because of your lower limb problem for which you are currently seeking attention. Please provide an answer for **each** activity.

Today, do you or would you have any difficulty at all with:

(Circle one number on each line)

Activities	Extreme Difficulty or Unable to Perform Activity	Quite a Bit of Difficulty	Moderate Difficulty	A Little Bit of Difficulty	No Difficulty
a. Any of your usual work, housework, or school activities.	0	1	2	3	4
b. Your usual hobbies, recreational or sporting activities.	0	1	2	3	4
c. Getting into or out of the bath.	0	1	2	3	4
d. Walking between rooms.	0	1	2	3	4
e. Putting on your shoes or socks.	0	1	2	3	4
f. Squatting.	0	1	2	3	4
g. Lifting an object, like a bag of groceries from the floor.	0	1	2	3	4
h. Performing light activities around your home.	0	1	2	3	4
i. Performing heavy activities around your home.	0	1	2	3	4
j. Getting into or out of a car.	0	1	2	3	4
k. Walking 2 blocks.	0	1	2	3	4
l. Walking a mile.	0	1	2	3	4
m. Going up or down 10 stairs (about 1 flight of stairs).	0	1	2	3	4
n. Standing for 1 hour.	0	1	2	3	4
o. Sitting for 1 hour.	0	1	2	3	4
p. Running on even ground.	0	1	2	3	4
q. Running on uneven ground.	0	1	2	3	4
r. Making sharp turns while running fast.	0	1	2	3	4
s. Hopping.	0	1	2	3	4
t. Rolling over in bed.	0	1	2	3	4
Column Totals:					

SCORE: _____/80

Error (single measure): ± 5 scale points

MDC: 9 scale points

MCID: 9 scale points

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Patient Specific Functional Scale

	Activities	Extreme Difficulty or Unable to Perform Activity	Quite a Bit of Difficulty	Moderate Difficulty	A Little Bit of Difficulty	No Difficulty
1	Any of your usual work, housework, or school activities.	0	1	2	3	4
2	Your usual hobbies, recreational or sporting activities.	0	1	2	3	4
3	Getting into or out of the bath.	0	1	2	3	4
4	Walking between rooms.	0	1	2	3	4
5	Putting on your shoes or socks.	0	1	2	3	4
6	Squatting.	0	1	2	3	4
7	Lifting an object, like a bag of groceries from the floor.	0	1	2	3	4
8	Performing light activities around your home.	0	1	2	3	4
9	Performing heavy activities around your home.	0	1	2	3	4
10	Getting into or out of a car.	0	1	2	3	4
11	Walking 2 blocks.	0	1	2	3	4
12	Walking a mile.	0	1	2	3	4
13	Going up or down 10 stairs (about 1 flight of stairs).	0	1	2	3	4
14	Standing for 1 hour.	0	1	2	3	4
15	Sitting for 1 hour.	0	1	2	3	4
16	Running on even ground.	0	1	2	3	4
17	Running on uneven ground.	0	1	2	3	4
18	Making sharp turns while running fast.	0	1	2	3	4
19	Hopping.	0	1	2	3	4
20	Rolling over in bed.	0	1	2	3	4
	Column Totals:					

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