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## **Mobilizations And Strengthening For Radiating Hip And Anterior Knee Pain: A Case Report**

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1     **Mobilizations and Strengthening for Radiating Hip and Anterior Knee Pain:**

2                                     **A Case Report**

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7

8     The patient has signed an informed consent allowing the use of his medical information and has

9     received the information on the institutions policies on the Health Insurance Portability

10    Accountability Act (HIPAA).

11

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14    their consent and cooperation.

15

16    Keywords: Hip mobilizations, Hip Instability, Knee Osteoarthritis, Anterior Thigh/Knee Pain

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24 **Abstract**

25 Background and Purpose: The most common joint disorder in the United States is osteoarthritis  
26 (OA). Knee OA occurs in 10% men and 13% in women aged 60 years or older. Hip instability is  
27 commonly defined as hip joint unsteadiness that may cause pain. Joint restrictions and lack of  
28 hip strength may be associated with these two conditions. However, there is limited literature on  
29 hip strengthening and mobilizations on positive outcomes with hip instability. Therefore, the  
30 purpose of this case report was to utilize hip strengthening and mobilizations interventions on a  
31 patient with hip instability and knee OA. Case Description: The patient was a 71-year-old male  
32 who presented with radiating hip and knee pain. Lower extremity myotomes, range of motion  
33 (ROM), the Lower Extremity Functional Scale (LEFS), Single Limb Stance Test (SLST), and  
34 Plumb line test were used to evaluate improvements. Interventions implemented included lower  
35 extremity strengthening, stretching, manual therapy, and balance training. Outcomes: The patient  
36 attended 11 visits over 6 weeks. LEFS improved from 47/80 to 53/80 and SLST on the right leg  
37 with eyes open from 7 seconds to 10 seconds. Discussion: Although the patient showed  
38 relatively small improvements, he reported a reduction in difficulty and pain during his work and  
39 daily living activities throughout the 6-week rehabilitation process. The patient was educated on  
40 his posture and proper body mechanics, which may have contributed to his reduction in radiating  
41 hip and knee pain. Utilizing hip strengthening and mobilization interventions for treatment of hip  
42 instability and knee OA may have positive outcomes but requires further investigation. Future  
43 research should focus on lower extremity strengthening and manual therapy for knee OA and hip  
44 instability.

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## 48 **Introduction/Background and Purpose**

49 Hip instability is a broad term for hip joint unsteadiness, which can be accompanied with  
50 or without pain.<sup>1</sup> Hip instability can be caused by a traumatic injury or can be atraumatic leading  
51 to capsular laxity or structural bony abnormality.<sup>2</sup> Hip instability has not received much attention  
52 due to the fact that it is poorly defined and lacks consistent objective evaluative criteria.<sup>1</sup> The  
53 initial treatment for hip instability usually begins with strengthening the hip dynamic stabilizers.<sup>2</sup>  
54 If conservative treatment fails the next option is surgery, which entails repairing of injured soft  
55 tissue structures or addressing structural bony abnormalities.<sup>2</sup> The integrity of the labrum and  
56 bony acetabular rim contributes to hip joint stability.<sup>1</sup> The two structures increase the surface  
57 area and the volume within the hip joint creating a distribution of joint stresses during loading.<sup>1</sup>  
58 The muscular component of hip stability includes the periarticular muscles and the iliopsoas  
59 musculotendinous unit.<sup>1</sup> The periarticular muscles assist with hip stability by increasing the joint  
60 reaction forces and compressing the femoral head into the acetabulum, while the iliopsoas  
61 muscle group helps resist anterior translation of the femoral head.<sup>1</sup> Therefore, muscle stability  
62 and strength in the hips will help improve the quality of how the hip joint functions.

63 Along with hip instability, knee osteoarthritis (OA) is another diagnosis that affects the  
64 lower extremities and can limit function. Knee OA is a degenerative joint disease that involves  
65 wear and tear of the articular cartilage in the knee.<sup>3</sup> Knee OA is a progressive disease and it  
66 comes along with knee pain that is worse with activity.<sup>3</sup> Symptoms can include knee stiffness,  
67 swelling, and pain that worsens from sitting or resting.<sup>3</sup> Knee OA is the most common form of  
68 arthritis found in both men and women and will continue to rise with the high prevalence of  
69 obesity.<sup>3</sup> There are about 240 cases of knee OA per 100,000 people per year and about 10% -  
70 13% of 60 year-olds are diagnosed with knee OA.<sup>3</sup> Although knee OA is a progressive disease  
71 there are modifiable risk factors that can slow the progression or help prevent the knee joint

72 disease.<sup>3</sup> Modifiable risk factors include articular trauma, occupation, muscle imbalance, weight  
73 and overall health.<sup>3</sup> The treatment for knee osteoarthritis has two approaches: non-surgical and  
74 surgical.<sup>3</sup> The non-surgical approach includes physical therapy, activity modification,  
75 medication, knee bracing and corticosteroid injections.<sup>3</sup> In a study performed by Deyle et al,<sup>4,5</sup>  
76 manual therapy applied to the lumbar spine, hip, and ankle if needed along with a standardized  
77 knee exercise program can delay or prevent the need for surgical intervention for patients  
78 diagnosed with knee osteoarthritis.<sup>4,5</sup>

79         Physical therapy interventions that are often used for hip instability and knee  
80 osteoarthritis focus on lower extremity strength, endurance, and manual therapy. Thus, the  
81 purpose of this case report was to apply the interventions above when a patient has both  
82 diagnoses concurrently.

### 83 **Patient History and Systems Review**

84         The patient agreed to be a part of this case report and was informed that the information  
85 provided would not reveal his identity. He signed a consent form and received a copy. He was a  
86 seventy-one-year-old Caucasian male, and his occupation was a carpenter and a farmer. He  
87 worked on his farm with his wife and milked goats to make cheese, yogurt, and other dairy  
88 products, managed his chickens and built houses for a living. He reported that he regularly  
89 climbed up and down ladders during his work hours. He drove a large pickup truck that had truck  
90 step bars for getting in and out of the truck.

91         The patient had emergency cauda equina surgery about a year ago and immediately after  
92 surgery he was fully functional. He started working again right after his surgery and his pain  
93 returned. When his pain returned, he started going to physical therapy to resolve his irritation and  
94 did well and became functional again. Unfortunately, at the beginning of this year he began to  
95 develop right anterior hip pain that radiated down to his right knee and reported that the pain was

96 usually relieved after a bowel movement. He did not get physical therapy treatment at the time  
97 for several reasons including the impact from the coronavirus disease 2019. The patient also had  
98 a medical history of a lumbar decompression on L4 – L5 about little over a year ago.

99 Refer to table 1A for the systems review performed at the initial visit. The patient had  
100 been referred to physical therapy by an orthopedic physician for lower extremity strengthening  
101 and lower extremity hip/knee pain. The orthopedic physician also prescribed a hip exercise. The  
102 exercise involved moving his right hip up and down, which immediately relieved his pain. He  
103 reported that his right hip and knee pain were unbearable and was only taking ibuprofen for  
104 relief. He reported that the pain was worse when he got out of his truck. He also reported he had  
105 no problem with sitting, although the pain that was in his right knee would come and go  
106 throughout the day. His primary complaint was his right hip and right knee pain impacting his  
107 carpenter and farm work. He was aware of his pain and understood that physical therapy would  
108 increase his function to return to work.

109 The patient was a good candidate for this case report for several reasons. He had a history  
110 of coming to physical therapy for his other pain (post-cauda equina surgery). He was compliant  
111 with his home exercise program (HEP) and reported that after every time he performed it the  
112 pain would disappear.

### 113 **Examination- Test and Measures**

114 The patient initially scored 47/80 (58.75%) on the Lower Extremity Functional Scale  
115 (LEFS). This test was reliable and assisted with the clinical decisions made (please refer to table  
116 2A).<sup>6</sup> The patient's Timed Up and Go (TUG) time was also assessed. He completed it in less  
117 than 14 seconds putting the patient not at a fall risk for his age.<sup>7</sup> The patient's active range of  
118 motion (ROM) in his bilateral lower extremities was assessed during the initial examination (IE),  
119 using the therapist's experience to indicate whether the patient had limited motion. The findings

120 indicated that the patient did have restrictions with right internal rotation and hip extension,  
121 which was 10 degrees for both. The most important findings were that the plumb line was  
122 moderately posterior to the hip joint, indicating that his pelvis was posteriorly tilted. Assessment  
123 of the patient's lower extremity reflexes and myotomes concluded that L3 and S1 had diminished  
124 reflexes bilaterally. Deep tendon reflexes were assessed to check the integrity of the two-neuron  
125 reflex arc involving the spinal brainstem segment that innervates the muscle.<sup>8</sup> The patient  
126 showed hyporeflexia which can be indicative of a disease that contains one or more parts of the  
127 two-neuron reflex arc.<sup>8</sup> Next, the patient's myotomes were assessed and found to be normal.  
128 Myotomes are a collection of muscle fibers innervated by the motor axons within each segmental  
129 nerve root.<sup>9</sup> Injury to the myotome nerve root can cause signs of weakness when being tested.  
130 The patient's unilateral lower extremity balance was assessed using the Single Limb Stance Test  
131 (SLST).<sup>10</sup> The patient stood on one limb and was timed for 10 seconds. He performed 7 seconds  
132 on the right leg and 10 seconds on the left leg. The Straight Leg Raise Test and Well Leg Raise  
133 Test were used on the patient in supine. The patient's leg was lifted on the affected side and non-  
134 affected side from 35 degrees to 70 degrees.<sup>11</sup> Both tests were found negative and the diagnosis  
135 herniated disc was ruled out.<sup>11</sup> The Flexion Adduction and Internal Rotation test to rule out  
136 femoral acetabular impingement (FAI). The FAI test was used, and the patient's hip was flexed,  
137 internally rotated, and adducted.<sup>12</sup> The test was found negative and FAI was ruled out.<sup>12</sup> Further  
138 details of LE findings appear in Table 1B.

### 139 **Clinical Impression: Evaluation, Diagnosis, Prognosis**

140       Upon systems review and IE, the patient presented with radiating right hip and knee pain.  
141 The patient performed a right hip hike exercise, which relieved his right hip/knee pain during  
142 static standing. This confirmed the diagnosis of hip instability. The patient had two other  
143 diagnoses that he came in with, right knee patellofemoral pain syndrome and unilateral primary

144 osteoarthritis in the right knee. The primary osteoarthritis in the right knee was confirmed with  
145 his radiography, but the right patellofemoral pain syndrome remained a question due to his right  
146 knee pain being immediately alleviated from a hip drop exercise in standing.

147         The patient continued to be appropriate for this case due to his increased pain levels  
148 during static standing, his positive outlook on his diagnoses, and his motivation to improve his  
149 physical function to return to work with minor difficulties. The patient's official ICD-10 medical  
150 diagnoses were M22.2X1 (Patellofemoral disorders, right knee), M25.351 (Other instability,  
151 right hip), and M17.11 (Unilateral primary osteoarthritis, right knee). The physical therapy  
152 diagnosis included hip muscular imbalance and postural malalignment. The prognosis for the  
153 patient was generally positive, due to several factors including his motivated attitude towards the  
154 diagnosis and immediate positive response to exercise. Research has shown that manual therapy  
155 in the lower extremity joints (hip, knee, and ankle) and spine along with supervised exercise has  
156 functional benefits for patients that are diagnosed with osteoarthritis of the knee.<sup>4,5</sup>

157         The patient did not need any other referrals to any other healthcare provider. His  
158 functional status was planned to be reassessed using the LEFS every thirty days as required by  
159 Medicare. Physical therapy interventions included manual therapy for his spine, hip, knee, ankle  
160 if needed along with core strengthening, lower extremity strengthening, and postural training.  
161 The lower extremity strengthening had a heavy emphasis on hip musculature. Short-term and  
162 long-term goals reassessed at 4 weeks and 8 weeks (Please refer to Table 2B).

### 163 **Intervention and Plan of Care**

#### 164 Coordination, Communication, Documentation

165         The IE and the plan of care (POC) information were communicated with the patient and  
166 his orthopedic physician. All the patient's documented notes were recorded on an electronic  
167 medical records system. The referring orthopedic physician had full access to the patient's POC



168 and daily notes. A re-examination was performed by the student physical therapist at 4 weeks  
169 and the patient's subjective report was documented after each treatment session.

#### 170 Patient/Client-Related Instruction

171           Following the IE, the patient was educated on his online HEP and remained compliant.  
172 This was confirmed through patient reporting knee and hip pain relief with HEP. He was  
173 educated on how to perform his exercises via verbal and tactile cues during the treatment  
174 sessions. He was also educated on how to exit his truck without twisting his spine/hips, due to  
175 exacerbated pain with this specific activity.

#### 176 Procedural Interventions

177           The patient participated in 11 treatment sessions over a six-week period, with a duration  
178 of each visit varying from 30-60 minutes. Interventions applied during each visit are provided in  
179 Table 3A, including the duration, frequency, and technique of the manual therapy. The timeline  
180 for the entire program is illustrated in Figure 1. Progressions were based on observation of the  
181 patient's functional performance and clinical judgement. The interventions consisted of lower  
182 extremity strengthening, postural cueing during exercises, soft tissue mobilization, flexibility  
183 exercise and joint mobilizations.

184           The initial hip flexor flexibility exercise performed by the patient was in half-kneeling.  
185 He was cued to keep an upright posture to increase the intensity of the hip flexor stretch. The  
186 passive hip flexor stretching exercise included the patient rolling a tennis ball on his right hip  
187 flexor muscle while in prone. Active and passive stretching has shown to increase flexibility in  
188 tight hip flexor muscles and increases hip extension ROM.<sup>13</sup>

189           Lower extremity strength and balance training included an emphasis on hip and knee  
190 strengthening, as requested by the orthopedic physician. Hip muscle weakness has been shown to  
191 increase in those with knee osteoarthritis due to the increase in medial compartment loading of

192 the tibia femoral joint.<sup>14</sup> Hip strengthening included isotonic exercises activating the adductors,  
193 hip abductors, hip internal/external and hip extensor muscles. Hip flexor strengthening was also  
194 added to the POC due to the iliopsoas muscle group resisting anterior translation of the femoral  
195 head.<sup>1</sup> The POC followed with closed chain hip exercises using orange, blue, and green  
196 therabands (The Hygienic Corporation Akron, OH) for moderate resistance. Resistance exercise  
197 has been shown to be effective for treating strength insufficiency and muscle activation  
198 imbalance in those with knee osteoarthritis.<sup>15</sup> The balance exercise incorporated into the POC  
199 was the single-limb stance, to help improve the patient's static steady-state balance.<sup>16</sup>

200 Manual therapy interventions included soft tissue mobilization (STM) to the psoas  
201 muscles, gluteus medius muscles, and the patient's post-surgical scar. These interventions were  
202 chosen to increase the patient's flexibility in those specific areas and were implemented using  
203 clinical judgment. However, there is lack of evidence for the use of STM for the purpose of  
204 increasing flexibility. Other manual therapy interventions included hip mobilizations  
205 (lateral/internal rotation and posterior) and lumbar traction for the purpose of relieving the  
206 patient's right knee and hip pain.<sup>17</sup> Hip mobilization with movement was performed in supine.  
207 The patient's right hip and knee were flexed to 90 degrees as the clinician assisted with a lateral  
208 distraction while internally rotating the patient's hip joint. This mobilization was performed  
209 during initial treatment and relieved the patient's right hip and knee pain immediately. Lateral  
210 hip distractions were discontinued as posterior hip glides were implemented. Posterior hip glides  
211 were used to treat the patient's anterior femoral translation. This treatment was used based off of  
212 clinical judgement. There are limited randomized controlled trials on hip mobilizations/lumbar  
213 traction on the treatment of anterior knee pain. However, the intervention was implemented due  
214 to immediate relief of his right knee/hip pain. Recent evidence demonstrated the short-term

215 effects of mobilization with movement on improving knee flexion ROM, lower extremity  
216 strength and hypoalgesia effect in patients with knee osteoarthritis.<sup>1</sup>

### 217 **Outcomes**

218         The patient showed similar baseline testing results on the RE at 4 weeks as shown in  
219 Table 1B. For an accurate measure of the patient's improvements, all tests and measures were  
220 performed identical to the IE. The patient's hip ROM and posture did not change. However, the  
221 patient had improvements with his LEFS score from 47 to 53 points. Specifically, he reported  
222 less difficulty with getting in and out of the car and with work activities. The patient's right leg  
223 SLST also improved from 7 to 10 seconds. However, his left SLST did not improve.

224         Over the course of his treatments, the patient reported gradual improvements with  
225 standing balance and pain reduction throughout the day. The patient reported no pain in his right  
226 knee while exiting his car and was able to perform all his ADLs with little to no difficulty. The  
227 only residual right hip and knee pain he reported would randomly appear while standing and  
228 talking to his customers. He reported that he was compliant with his HEP and that it helped  
229 reduce his pain. The patient attended all 11 treatment sessions, but he needed to leave 2-3  
230 treatments early due to his work schedule.

### 231 **Discussion**

232         This case report demonstrated the intended purpose of hip strengthening and  
233 mobilizations for the management of a patient diagnosed with hip instability and knee  
234 osteoarthritis. The patient did not show improvements in hip ROM, gross lower extremity  
235 strength, deep tendon reflexes, and posture within the 6-week period. Although the increase in  
236 the patient's LEFS score did not exceed a published minimally clinically important difference  
237 value of nine points,<sup>6</sup> he reported that his improvements made his work and daily activities  
238 easier. The objective measures, especially his balance and range of motion, likely did not

239 improve due to the 6-week time constraint.

240           One of the strengths in this case report was the use of evidence-based interventions and  
241 patient education. Manual therapy and lower extremity strengthening were applied to the  
242 patient's diagnoses. These interventions have been reported to increase functional outcome.<sup>5</sup>  
243 Kalisvaart et. al described that the iliopsoas muscle unit helps resist anterior translation of the  
244 femoral head.<sup>1</sup> Therefore, the author prescribed hip flexor strengthening and performed posterior  
245 hip mobilizations. The patient was also educated on his posture and proper body mechanics  
246 while getting out of his truck. After his adjustments in his posture and body mechanics, he  
247 reported a reduction in pain throughout the day. A limitation in this case was the lack of an  
248 objective measure of the patient's isolated muscle strength. Another limitation was that the  
249 individual effectiveness of the hip strengthening, mobilizations, and patient education could not  
250 be fully determined because they were delivered in combination.

251           In conclusion, strength/balance training and manual intervention may benefit a patient  
252 diagnosed with hip instability and knee osteoarthritis. Although, there needs to be further  
253 research to confirm that hip instability can be treated with strength training.

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335 **TABLES and FIGURES**

336 **Table 1A. Systems Review**

<b>Systems</b>	<b>Findings</b>
Cardiovascular/Pulmonary	Not impaired
Musculoskeletal	Low Back Pain with Passive Right Hip Extension
Neuromuscular	Reflex/Sensory Integrity: L3 and S1, 1+ (Diminished) Bilateral
Integumentary	Not Impaired
Communication	Not impaired
Affect, Cognition, Language, Learning Style	Not impaired Preferred Language: English Learning Style: Verbal, Tactile, and Visual

337

338 **Table 1B. Tests and Measures**

<b>Examination Measure</b>	<b>Initial Evaluation Results</b>	<b>Outcomes at 4 weeks</b>
Posture	Hips anterior to plumb line	Hips anterior to plumb line
Lower Extremity Myotomes	L2 Hip Flexion: Left 5/5 Right 5/5 L3 Knee Extension: Left 5/5 Right 5/5 L4 Ankle Inversion: Left 5/5 Right +4/5 L5 Great Toe Extension: Left 5/5 Right +4/5 S1-2 Ankle Plantar Flexion: Left 5/5 Right +4/5	L2 Hip Flexion: Left 5/5 Right 5/5 L3 Knee Extension: Left 5/5 Right 5/5 L4 Ankle Inversion: Left 5/5 Right +4/5 L5 Great Toe Extension: Left 5/5 Right +4/5 S1-2 Ankle Plantar Flexion: Left 5/5 Right +4/5
Reflex	L3 Patellar Tendon: Bilateral 1+ Diminished S1 Achilles Tendon: Bilateral 1+ Diminished	L3 Patellar Tendon: Bilateral 1+ Diminished S1 Achilles Tendon: Bilateral 1+ Diminished
Range of Motion	Hip Extension: Left PROM 10 degrees, Right PROM 10 degrees Internal rotation: Left Within normal limits, Right PROM 10 degrees	Hip Extension: Left PROM 10 degrees, Right PROM 10 degrees Internal rotation: Left Within normal limits, Right PROM 10 degrees
Special Tests	Straight Leg Raise: Negative Well Leg Raise: Negative Flex Internal rotation Adduction Test: Negative	Straight Leg Raise: Negative Well Leg Raise: Negative Flex Internal rotation Adduction Test: Negative

339 **PROM = Passive Range of Motion**

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343 **Table 2A: Functional Outcomes**

Functional Outcome Measure	Initial Evaluation	Outcomes
Lower Extremity Functional Scale (LEFS)	Total points: 47	Total points: 53
Timed Up and Go (TUG)	Less than 14 seconds	Less than 14 seconds
Single Limb Stance Test (SLST)	Left Leg, Eyes Open, Firm: Good (10 seconds) Right Leg, Eyes Open, Firm: Fair (7 seconds)	Left Leg, Eyes Open, Firm Good (10 seconds) Right Leg, Eyes Open, Firm: Fair (10 seconds)

344

345 **Table 2B: Short and Long-Term Goals**

Short Term Goals	Long Term Goals
<ol style="list-style-type: none"> <li>1. Symptomatic Improvements: The Patient will decrease his pain in the right knee and hip to 2/10 within 4 weeks. (Goal Unaccomplished)</li> <li>2. Biomechanical Improvements: The patient will improve his posture by decreasing his hip/pelvic girdle asymmetry to trace levels within 4 weeks. (Goal Unaccomplished)</li> <li>3. Functional Tests: Balance: Patient will perform single limb stance for at 10 seconds in bilateral lower extremities within 4 weeks. (Goal Accomplished)</li> </ol>	<ol style="list-style-type: none"> <li>1. Symptomatic Improvements: The patient will centralize his radicular symptoms within 8 weeks. (Unable to assess)</li> <li>2. Biomechanical Improvements: The patient will improve his posture by decreasing his hip/pelvic girdle asymmetry to normal levels within 8 weeks. (Unable to assess)</li> <li>3. Functional Tests: Balance: Patient will perform single limb stance for at 20 seconds in bilateral lower extremities within 8 weeks. (Unable to assess)</li> <li>4. Reflex/Sensory Integrity: Myotomes: The patient will increase his myotome testing to bilaterally 5/5 in hip flexion, knee extension, ankle inversion, great toe extension, ankle plantar flexion within 8 weeks. (Unable to assess)</li> </ol>

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**Table 3A: Interventions by Treatment Session**

Manual Therapy	Rx 1	Rx 2	Rx 3	Rx 4	Rx 5	Rx 6	Rx 7	Rx 8	Rx 9	Rx 10 (RE)	Rx 11
R Lateral Hip Distraction in 90 degrees Flexion with IR Mobilization with Movement	5 minutes Grade: II/III	5 minutes Grade: II/III	5 minutes Grade: II/III	6 minutes Grade: II/III	6 minutes Grade: II/III	6 minutes Grade: II/III	7 minutes Grade: II/III				
R Posterior Hip Glide in 30 degrees Flexion (Oscillatory)								10 minutes Grade: II/III		10 minutes Grade: II/III	10 minutes Grade: II/III
R Long Axis Hip Distraction (Sustained)											5 minutes Grade: II/III
R Femoral Nerve Glide (Mobilize and Elongate)	5 minutes									10 Minutes	
Psoas and Gluteus Medius STM (Strumming)		8 minutes	8 minutes	8 minutes		8 Minutes			4 Minutes	8 Minutes	
Lumbar Traction Hook-lying (Intermittent)				5 minutes		8 Minutes	8 Minutes				
Post-Surgical Scar STM on L4-L5 (Strumming)									4 Minutes		
<b>Flexibility Exercises</b>											
Hip Flexor Stretch (Half-Kneeling)		3x30 seconds		3x30 seconds							
Psoas Tennis ball rolling in Prone (R Hip)								5 minutes			
<b>Strengthening Exercises</b>											
Bridging	3x10	3x10	3x10 Blue TB around Knees		3x10 Blue TB around Knees	3x10 Blue TB around Knees					
Side-lying Hip Abduction		3x10 Bodyweight									
Side-lying Hip ER (Clam shells) TB around Knees					3x10 Blue TB around	3x10 Blue TB around					

Ho, Hip Instability and Knee Osteoarthritis

					Toes	Toes					
Hip Clocks: 3-point TB around Ankle							3x10				
Standing Knee Flexion (Hamstring Curl) with Ankle Weight							3x10 3 lb.		3x10 3 lb.		
Dynamic Hip Abduction (Side Steps) TB around Toes					3x10 Blue TB around Toes	3x10 Blue TB around Toes					
Step-Ups: Forward onto 12-inch Step						3x10 holding 5 lb. dumbbells in each hand					
Single Leg Deadlift							3x10				
Leg Press (Life Fitness Pro Horizontal Leg Press, Rosemont, Illinois)							3x10 100 lb.				
Standing Hip Flexion TB around Midfoot								3x10 Orange TB	3x10 Orange TB		
Supine Hip Flexion TB around Midfoot								3x10 Orange TB			
Side-Lying Hip ER (Knee to Knee)								3x10 Bodyweight	3x10 Bodyweight	3x10 1 lb. ankle weights	3x10 1 lb. ankle weight
Side-Lying Hip IR (Reverse Clamshells Heel to Heel)								3x10 Bodyweight	3x10 Bodyweight	3x10 1 lb. ankle weights	3x10 1 lb. ankle weight
Straight Leg Raise (Supine)								3x10 Bodyweight	3x10 with 2 lb. ankle weight		
Straight Leg Raise (Side-lying for Adduction)										3x10 with 1 lb.	

Ho, Hip Instability and Knee Osteoarthritis

										ankle weight	
Corrective Bodyweight Squats											3x10
Slide Board Hip Adduction (Towel Under Foot)											3x10
Standing Shoulder Rows (Scapular Retraction)			3x10 Orange TB	3x10 Green TB							
Standing Shoulder Extensions			3x10 Orange TB	3x10 Green TB							
<b>Balance Exercises</b>											
Single Limb Stance					3x30 seconds	3x30 seconds					

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348 R = Right, TB = Theraband, IR = Internal Rotation, ER = External Rotation, STM = Soft Tissue Massage, Empty Box = Indicates Exercise

349 Was Not Performed

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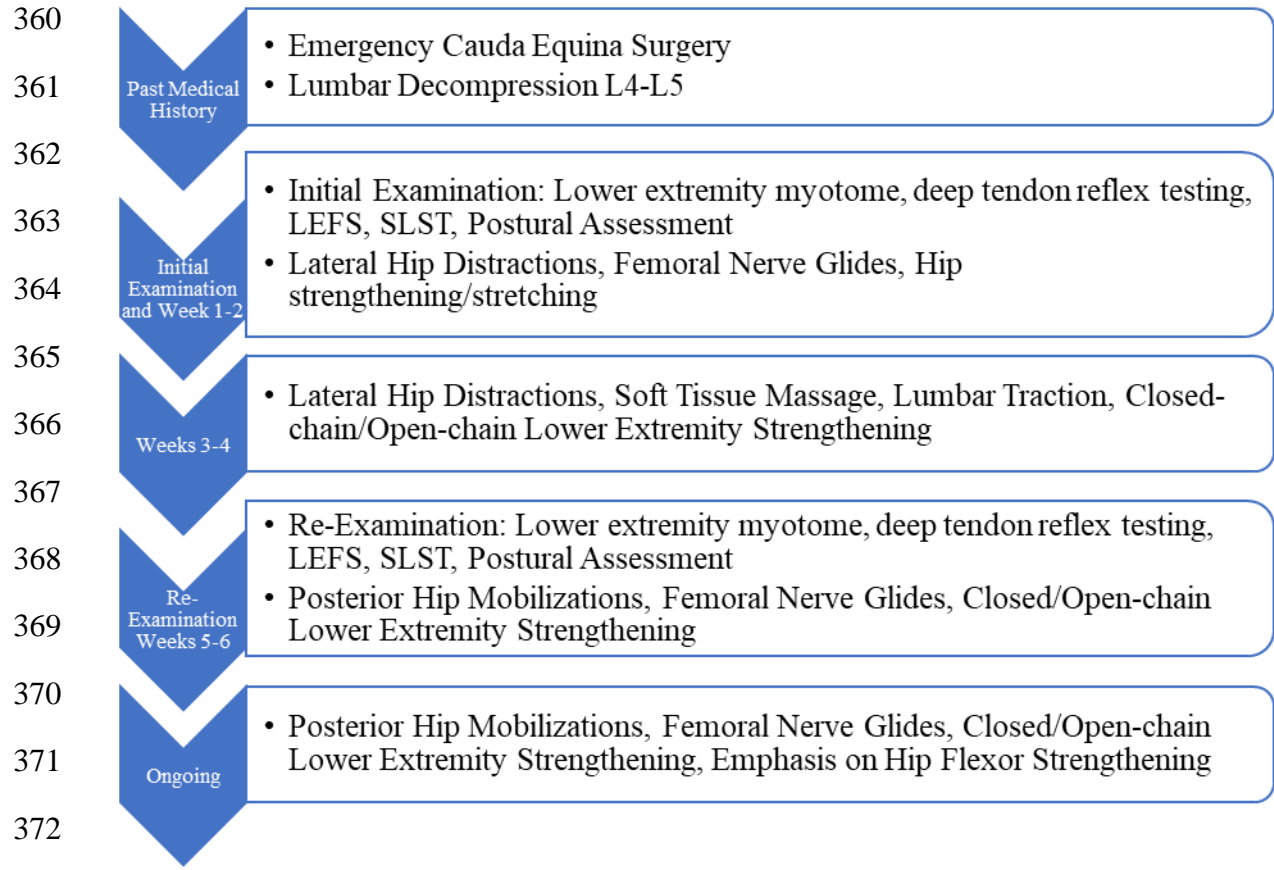
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359 **Figure 1. Timeline for Episode of Care**



373 LEFS = Lower Extremity Functional Scale, SLST = Single Limb Stance Test

374 **CARE Checklist**

375

<b>CARE Content Area</b>	Page
1. <b>Title</b> – The area of focus and “case report” should appear in the title	1 376
2. <b>Key Words</b> – Two to five key words that identify topics in this case report	1 377
3. <b>Abstract</b> – (structure or unstructured) a. Introduction – What is unique and why is it important? b. The patient’s main concerns and important clinical findings. c. The main diagnoses, interventions, and outcomes. d. Conclusion—What are one or more “take-away” lessons?	2 378 379
4. <b>Introduction</b> – Briefly summarize why this case is unique with medical literature references.	3,4
5. <b>Patient Information</b> a. De-identified demographic and other patient information. b. Main concerns and symptoms of the patient. c. Medical, family, and psychosocial history including genetic information. d. Relevant past interventions and their outcomes.	4,5
6. <b>Clinical Findings</b> – Relevant physical examination (PE) and other clinical findings	5,6
7. <b>Timeline</b> – Relevant data from this episode of care organized as a timeline (figure or table).	20
8. <b>Diagnostic Assessment</b> a. Diagnostic methods (PE, laboratory testing, imaging, surveys). b. Diagnostic challenges. c. Diagnostic reasoning including differential diagnosis. d. Prognostic characteristics when applicable.	6,7
9. <b>Therapeutic Intervention</b> a. Types of intervention (pharmacologic, surgical, preventive). b. Administration of intervention (dosage, strength, duration). c. Changes in the interventions with explanations.	7,8,9,10
10. <b>Follow-up and Outcomes</b> a. Clinician and patient-assessed outcomes when appropriate. b. Important follow-up diagnostic and other test results. c. Intervention adherence and tolerability (how was this assessed)? d. Adverse and unanticipated events.	10
11. <b>Discussion</b> a. Strengths and limitations in your approach to this case. b. Discussion of the relevant medical literature. c. The rationale for your conclusions. d. The primary “take-away” lessons from this case report.	10,11
12. <b>Patient Perspective</b> – The patient can share their perspective on their case.	5
13. <b>Informed Consent</b> – The patient should give informed consent.	1