

**OUTPATIENT PHYSICAL THERAPY PLAN OF CARE FOLLOWING a MOTOR VEHICAL  
ACCIDENT: CASE REPORT**

**By**

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## **Abstract**

**Background and Purpose:** Motor vehicle accidents are a common occurrence globally. They can lead to complex injuries with an extensive plan of care. During motor vehicle accidents, the head, neck, low back, and limbs are most frequently injured. This case report provides an example of how to treat a patient with a complex physical therapy diagnosis caused by a motor vehicle accident. This case report provides an example of how to treat a patient with a complex physical therapy diagnosis caused by a MVA. **Case Description:** The patient was a 33-year-old female who presented with complaints of cervical, left upper extremity, and low back pain following a motor vehicle accident at the end of May. The patient exhibited impairments including pain, decreased ROM, and cervical muscle imbalances causing cervicogenic headaches. Interventions focused on reducing pain and tension throughout the spine, improving range of motion and strength in the back and core, and improving activity tolerance to occupational activities. **Outcomes:** Patient demonstrated improvements in all impairments and outcome measures performed at initial evaluation. The patient remained engaged with all exercises throughout her plan of care, including her home exercise program. **Discussion:** When providing therapy to patients after a motor vehicle accident, there can be many factors to keep in mind. They often have injuries to many body regions leading to an extensive plan of care. Common interventions for treating mechanical neck pain and discogenic low back are beneficial; however, it is essential to closely monitor these patient's due to the variability in the patient's irritability from one session to the next.

**Key Words:** physical therapy, motor vehicle accident, mechanical neck pain, discogenic low back pain

## **Introduction**

Motor vehicle accidents (MVA) are among the most common causes of injury-related disability in the United States.<sup>1</sup> MVAs are a large economic burden across the globe due to their prominence and how they can lead to complex injuries in many body regions. For this reason, the rehabilitation process for an individual who was in a MVA is often quite extensive. The head, neck, low back, and limbs are frequently injured locations during MVAs.<sup>2,3</sup> Physical therapist have the privilege to play a vital role in improving patient impairments related to MVAs. Physical therapy impairments seen in patients involved in MVAs include but are not limited to pain, decreased range of motion (ROM), decreased strength, and cervicogenic related headaches.<sup>4,5</sup> Impairments range in severity and how functionally limiting they are for each patient.<sup>1</sup> Increased irritability is common from one physical therapy session to the next in patients involved in MVAs. This requires the supervising physical therapist to be flexible and capable of regressing or altering the plan of care if required. This case report will discuss the outpatient physical therapy rehabilitation process for a patient that was in a motor vehicle accident affecting their head, neck, low back, left upper extremity, and right lower extremity. This case provides one example of how to treat a patient with a complex physical therapy diagnosis caused by a MVA.

## **Case Description**

The patient in this case report was a 33-year-old female who presented with complaints of cervical, left upper extremity, and low back pain following a MVA at the end of May 2022. The patient states that she was rear ended and pushed forward into multiple cars in front of her. The MVA was three weeks prior to the patient's initial evaluation, and she reported that MRIs of her neck and back were already performed preceding her initial eval. She stated that the MRI of her neck was unremarkable; however, she noted that the MRI of her back displayed L4-L5 and L5-S1 disc herniations. The patient stated that she is employed as a hair stylist and was independent with all activities of daily living prior to her MVA. She reported no significant past medical history or comorbidities but noted a history of alcohol abuse. The patient's injuries caused her tolerance to her typical daily activities and occupational duties as a hair stylist to be limited. Pain provoking movements included bending over, squatting, prolonged standing, prolonged sitting, and cervical rotation. Occasional shooting pain down the posterior right extremity with prolonged sitting and numbness in the left upper extremity with cervical rotation were reported. The patient also noted that she had been experiencing some minor headache and dizziness symptoms since her initial accident. Due to the patient's report of an unremarkable cervical MRI and obtaining an accurate subjective history, the patient was cleared of all other cervical and lumbar red flag signs. The patient stated that she enjoyed doing yoga but no longer can due to her current pain. Pain was reported as 7/10 on the visual analog scale (VAS) for the patient's back and 3/10 on the VAS for the patient's neck and left upper extremity. The patient reported minimal reduction in irritability with pain medication, muscle relaxers, and intermittent heat or ice.

## **Examination**

Prior to starting the initial examination, the patient filled out three outcome measures. Due to the areas of pain the patient presented with, the outcome measures selected were the Oswestry Disability Index, the Neck Disability Index, and the QuickDASH. The selected outcome measures were determined to be valid and reliable for testing patient disability caused by neck, back, or shoulder pain.<sup>6-8</sup> During the initial exam, additional outcome measures including goniometric ROM and manual muscle testing (MMT) were assessed. These measures were also determined to be reliable for testing ROM and strength.<sup>9-10</sup> Initial examination scores for each outcome measure are in Tables 1.1-1.3. During active ROM testing with the goniometer, the patient reported pain with various movements. Pain was reported in the left upper trapezius (trap) with right cervical rotation. Pain was also reported in the low and mid back with lumbar extension. The patient reported a “throbbing” sensation in the left side of her low back with right lumbar side bending. Additional “tightness” was noted along the cervicothoracic junction with cervical flexion and in the right upper trap and right low back with left cervical and lumbar side bending respectfully. Due to the patient exhibiting pain along her entire spinal column, MMT testing was performed using upper and lower extremity myotomes to determine the patient’s global strength and if there were any myotomal weaknesses present. The patient reported pain at her left deltoid tuberosity with left shoulder abduction and in her right hip with right hip flexion. Additional special tests administered during the initial examination included the alar ligament laxity test, the sharp purser test, the vertebral artery insufficiency test, the slump test, and the spurling’s test. All special tests were concluded to be negative. Upper and lower extremity muscle stretch reflexes were also tested. Upper extremity reflexes were typical and lower extremity reflexes were slightly diminished; however, the patient noted that this was her baseline and that her lower extremity reflexes were slightly diminished prior to her initial injury. After

completing all subjective questioning and objective testing, the patient was determined to be appropriate for physical therapy intervention. She exhibited symptoms concurrent with mechanical neck pain and discogenic low back pain caused by her MVA. The patient displayed impairments including pain, decreased ROM, and cervical muscle imbalances causing cervicogenic headaches. Her impairments led her to be functionally limited with her tolerance to her typical daily and occupational related activities as a hair stylist. The aim for this patient's plan of care was to improve her tolerance to her typical daily and occupational activities and return to her prior level of function with decreased difficulty. The patient's prognosis was excellent due to her prior level of function and positive demeanor toward physical therapy. The plan of care consisted of manual therapy, therapeutic exercise, therapeutic activities, neuromuscular reeducation, patient education, a home exercise program, and modalities as needed or upon patient request. Upon approval from the patient's insurance, she was approved for 12 sessions. The sessions were completed over four weeks, with the patient receiving 3 treatments per week over the four-week span.

## **Intervention**

The patient's plan of care began with her initial evaluation. Outcomes from the initial evaluation can be found in the section above, as well as in Tables 1.1-1.3. Interventions administered during each session can be found in Table 2. Each treatment session started with manual therapy. The type of manual therapy utilized included soft tissue mobilizations (mobs), posterior to anterior (PA) spinal mobs, right lumbar rotation spinal manipulation, manual lumbar traction, and a muscle energy technique (MET). Manual therapy was performed to reduce pain and increase ROM.<sup>4,5,11</sup> Due to the patient's complaint of neck pain, soft tissue mobs were applied to her bilateral upper traps during the 1st treatment session. Soft tissue mobs to the upper traps were ceased during week 2 due to patient reports of large improvements in her neck pain and ROM. As the patient progressed through her plan of care, she started to complain about pain near her right gluteus medius (glute med). Soft tissue mobs and a muscle energy technique were utilized to reduce this pain.<sup>12</sup> After completing manual therapy, the patient began performing her exercises. Exercises consisted of therapeutic exercises (ther-ex), therapeutic activities (ther act), and neuromuscular reeducation. Exercises can be found in Table 2. Neuromuscular reeducation included educating the patient on how to engage her core and glutes during each of her exercises to provide greater stabilization during activity. Exercises were focused on improving lumbar ROM, core and bilateral lower extremity strength, activity tolerance to occupational activities, and reducing muscular tension in the cervical and lumbar regions as well as the right lower extremity.<sup>4,5</sup> As with soft tissue mobilizations to the cervical region, exercises for the neck were ceased during week 2 due to patient reports of improved neck pain; however, the patient was educated to continue with her home exercise program which included cervical stretches for her traps and levator scapulae. After completing all exercises, the patient was asked if she would like to receive heat and electrical stimulation (estim). These modalities were administered to reduce

pain and increase extensibility in lumbar paraspinals.<sup>5</sup> Interferential current stimulation was the type of estim applied. Heat and estim were ceased after session 4 upon the patient's request. Exercises were progressed as the patient tolerated. Stretches were performed 3 times for 30 seconds. Bent knee fallouts were completed for 10 reps with a 10 second hold with both lower extremities. Prone press ups and lateral trunk rotations were performed for 3 minutes. Clamshells were executed for 3 sets of 10 reps with both lower extremities and using a Theraband. The Theraband was progressed in resistance as the patient tolerated. Bridges were performed for 3 sets of 10 reps with a dumbbell over the patient's pelvis. The dumbbell was progressed in weight as the patient tolerated. Bird dogs and dead bugs were progressed in the number of repetitions. Therapeutic activities were performed for 3 sets of 10 reps. The surface which each therapeutic activity was performed on was progressed to be more difficult as the patient tolerated.



## **Outcomes**

The patient completed all 12 visits per her physical therapy plan of care. At the time of discharge, the patient reported improvements in all impairments associated with mechanical neck pain and discogenic low back pain caused by her MVA. The patient reported improvements in all outcome measures at discharge (Tables 3.1.-3.3) when compared to the same outcome measure that were taken upon the initial examination (Tables 1.1-1.3). As previously stated, all interventions were selected, progressed, regressed, or ceased in accordance with their relevance for this patient and her tolerance to each intervention. She remained engaged with all exercises throughout her plan of care, including her home exercise program. By the end of this patient's plan of care, she returned to her prior level of function with decreased difficulty. She still reported 2/10 back pain with prolonged standing during work but noted that pain was manageable. The patient was given an updated home exercise program including bird dogs, dead bugs, and clamshells upon discharge.

## **Discussion**

As discussed previously, following the end of this patient's plan of care, she was able to make improvements in all impairments discovered upon the initial examination. As seen with the improved scores on the Oswestry Disability Index, Neck Disability Index, and QuickDASH, the patient also perceived that she had improved in function and irritability upon discharge. The interventions selected were backed by research into appropriate interventions for someone exhibiting symptoms such as the ones the patient in this case report presented with.<sup>4,5,12</sup>

Additional weight bearing exercises could have been implemented in order further improve the patient's tolerance to prolonged standing during work and other weight bearing activities. The patient quickly saw the benefits of physical therapy intervention which allowed her to buy in from the initiation of her plan of care. There is not much research on the importance of patient engagement in improving patient outcomes; however, it is ultimately the patient's right to decide what interventions they choose to participate in. Since the patient was engaged in her plan of care at the initiation of therapy, she remained adherent to her home exercise program which helped facilitate a quicker return to her prior level of function. MVAs are unfortunately a common occurrence; nevertheless, they can lead to complex injuries that create an extensive plan of care.<sup>1-3</sup> This case report provides some insight on the benefits of the selected interventions in improving impairments related to mechanical neck pain and discogenic low back pain caused by a MVA. Further research should look at how the interventions implemented in this case report can be altered for a similar patient who has an increased irritability of symptoms.

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## Tables and Figures

*Table 1.1 Outcome Measures at Initial Evaluation*

<b>Outcome Measure</b>	<b>Score</b>
Oswestry Disability Index	56%
Neck Disability Index	46%
QuickDASH	40%

*Table 1.2 Range of Motion at Initial Evaluation*

<b>Movement</b>	<b>Left</b>	<b>Right</b>
Cervical flexion	43°	
Cervical extension	60°	
Cervical rotation	80°	68°
Cervical side bending	35°	45°
Lumbar flexion	60°	
Lumbar extension	10°	
Lumbar side bending	20°	23°

*Table 1.3 Manual Muscle Testing at Initial Evaluation*

<b>MMT</b>	<b>Left</b>	<b>Right</b>
Shoulder flexion	5/5	5/5
Shoulder abduction	5/5	5/5
Elbow flexion	4/5	4/5
Elbow extension	4/5	4/5
Wrist flexion	5/5	5/5
Wrist extension	4/5	4/5
Finger abduction	5/5	5/5
Hip flexion	4+/5	4+/5
Knee flexion	4+/5	4+/5
Knee extension	4+/5	4+/5
Plantar flexion	5/5	5/5
Dorsiflexion	5/5	5/5

Table 2 Interventions Administered Throughout Plan of Care

Session #	1 <sup>st</sup> (Initial Eval)	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>
<b>Manual Therapy</b>		Soft tissue mobs: Bilateral upper trap & right lumbar paraspinals, Lumbar traction	Soft tissue mobs: Bilateral upper trap & right lumbar paraspinals, Lumbar traction	Soft tissue mobs: Right lumbar paraspinals, Lumbar traction	Soft tissue mobs: Right lumbar paraspinals & glute medius, Lumbar traction	Soft tissue mobs: Right lumbar paraspinals & right glute med, Lumbar traction
<b>Modalities</b>	Heat pack, Estim		Heat pack, Estim	Heat pack, Estim		
<b>Stretches</b>	Upper trap	Upper trap, Levator, Single knee to chest	Upper trap, Levator, Single knee to chest, Piriformis	Single knee to chest, Piriformis, Foam roller on right glute med	Single knee to chest, Piriformis, Foam roller on right glute med	Single knee to chest, Piriformis, Foam roller on right glute medius
<b>Ther-Ex</b>	Bent knee fallouts, Prone press ups	Bent knee fallouts, Prone press ups, Glute bridges, Cervical isometrics, Clamshells	Bent knee fallouts, Prone press ups, Glute bridges, Clamshells, Dead bugs	Bent knee fallouts, Prone press ups, Glute bridges, Clamshells, Dead bugs	Bent knee fallouts, Prone press ups, Glute bridges, Clamshells, Dead bugs, Lateral trunk rotations	Bent knee fallouts, Prone press ups, Glute bridges, Clamshells, Dead bugs, Lateral trunk rotations, Bird dogs

<b>Ther Act</b>					Forward step ups, Side step ups	Forward step ups, Side step ups
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<b>Session #</b>	<b>7<sup>th</sup></b>	<b>8<sup>th</sup></b>	<b>9<sup>th</sup></b>	<b>10<sup>th</sup></b>	<b>11<sup>th</sup></b>	<b>12<sup>th</sup> (Discharge Eval)</b>
<b>Manual Therapy</b>	Soft tissue mobs: Right glute med, Lumbar traction, Grade III PA mobs to L3-L5, Grade V right lumbar rotation mobs to L3-L5, MET	Soft tissue mobs: Right glute med, Lumbar traction, Grade III PA mobs to L3-L5, MET	Soft tissue mobs: Right glute med, Lumbar traction, Grade III PA mobs to L3-L5, MET	Soft tissue mobs: Right glute med, Lumbar traction, Grade III PA mobs to L3-L5, MET	Soft tissue mobs: Right glute med, Lumbar traction, Grade III PA mobs to L3-L5, MET	Soft tissue mobs: Right glute med, Lumbar traction, Grade III PA mobs to L3-L5, Grade V right lumbar rotation mobs to L3-L5, MET
<b>Stretches</b>	Single knee to chest, Piriformis, Foam roller on right glute med, Hamstring, Upper trap, Levator	Single knee to chest, Piriformis, Foam roller on right glute med, Hamstring	Single knee to chest, Piriformis, Foam roller on right glute med, Hamstring	Single knee to chest, Piriformis, Foam roller on right glute med, Hamstring	Single knee to chest, Piriformis, Foam roller on right glute med, Hamstring	Single knee to chest, Piriformis, Foam roller on right glute med, Hamstring
<b>Ther-Ex</b>	Bent knee fallouts, Prone press ups, Glute bridges, Clamshells, Dead bugs,	Bent knee fallouts, Prone press ups, Glute bridges, Clamshells, Dead bugs,	Bent knee fallouts, Prone press ups, Glute bridges, Clamshells,	Bent knee fallouts, Prone press ups, Glute bridges, Clamshells,	Bent knee fallouts, Prone press ups, Glute bridges, Clamshells, Dead bugs,	Bent knee fallouts, Prone Press ups, Glute bridges, Clamshells,

	Lateral trunk rotations, Bird dogs	Lateral trunk rotations, Bird dogs	Dead bugs, Lateral trunk rotations, Bird dogs	Dead bugs, Lateral trunk rotations, Bird dogs	Lateral trunk rotations, Bird dogs	Dead bugs, Lateral trunk rotations, Bird dogs
<b>Ther Act</b>	Forward step ups, Side step ups, TRX squats	Forward step ups, Side step ups, TRX squats	Forward step ups, Side step ups, TRX squats	Forward step ups, Side step ups, TRX squats	Forward step ups, Side step ups, TRX squats	Forward step ups, Side step ups, TRX squats

Table 3.1 Outcome Measures at Discharge

Outcome Measure	Score
Oswestry Disability Index	22%
Neck Disability Index	15%
QuickDASH	8%

Table 3.2 Manual Muscle Testing at Discharge

MMT	Left	Right
Shoulder abduction	5/5	5/5
Hip flexion	5/5	5/5

Table 3.3 Range of Motion at Discharge

Movement	Left	Right
Cervical flexion	50°	
Cervical rotation	80°	80°
Cervical side bending	45°	45°
Lumbar extension	20°	
Lumbar side bending	25°	25°