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Inpatient Rehabilitation Of A 99-Year-Old Patient Following A High-Impact Unstable Pelvic Ring Fracture: A Case Report

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The patient signed an informed consent allowing the use of medical information and photo/video footage for this report. The patient received information on the university's policies regarding the Health Insurance Portability and Accountability Act.

Key Words: Unstable pelvic ring, Pelvic fracture, Physical therapy

ABSTRACT

Background: Unstable pelvic ring fractures (PRF) seldom occur in isolated injuries. Most pelvic fractures are caused by motor vehicle accidents (MVA) concurrently with multiple traumas. PRF have an extremely high mortality rate, ranging from 20-50%. When patients suffer multiple traumas including a pelvic fracture, their mortality rate increases by 10%, and their ability to return home after treatment decreases by 33%. The purpose of this case report was to describe the outcomes of physical therapy (PT) interventions for a nonagenarian patient following an unstable PRF. **Case Description**: A 99 year-old male suffered a high impact unstable PRF in addition to other traumas secondary to an MVA. Following discharge from acute care, the patient received PT seven days a week for 14 sessions. The plan of care included bed mobility, lower extremity strengthening and functional transfer, gait, and balance training.

Outcomes: The patient demonstrated progress by improvement in the Timed Up and Go (unable to 22 seconds), the Two Minute Walk Test (31 meters to 104 meters), and the Modified 30 Second Sit to Stand (0 to 9 chair rises). The patient's observed gait pattern and level of independence with bed mobility and functional transfers improved from evaluation to discharge.

Discussion: The patient appeared to have benefitted from PT based on his improvement in functional mobility, strength, gait, and balance. The patient's age and extent of injury presented an interesting clinical challenge to rehabilitation that is not commonly seen in literature to date. Further research on treatment interventions for pelvic fractures, as well as normative values for functional outcome measures in the extreme geriatric population would be beneficial for designing and assessing progress of rehabilitation programs.

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----------PART ONE BEGINS HERE----------

INTRODUCTION/BACKGROUND and PURPOSE

Unstable pelvic ring fractures are defined by the displacement and deformity of the pelvic bones.[1] Pelvic fractures are rare and only make up 3% of all skeletal injuries; however, the mortality rate of unstable pelvic fractures is extremely high, ranging from 20-50%.[2,3] Although open reduction with internal fixation (ORIF) procedures for unstable pelvic ring fractures have improved in recent years, one study showed only 60% of patients had a good long term prognosis following ORIF placement.[4]

Unstable pelvic ring fractures seldomly occur in isolated injuries.[4] Most pelvic fractures are caused by motor vehicle accidents (MVA) in which patients suffer multiple traumas.[2] When patients suffer multiple traumas including a pelvic fracture, their mortality rate increases by 10%, and their quality of life, functional mobility, and ability to return home after treatment decreases by 33%.[4]

Research has shown that early mobilization with passive range of motion (PROM) and active assistive range of motion (AAROM), followed by progressive resistive exercises, lower extremity (LE) strength training, and gait training have had some positive rehabilitation outcomes for patients with pelvic ring fractures.[5] However, the literature on the rehabilitation management of postoperative pelvic fractures is limited which makes it difficult to predict how a patient will perform and progress compared to patients with similar injuries.[2]

This case report documents the physical therapy (PT) management of a 99-year-old patient who suffered a high impact unstable pelvic ring fracture in addition to other traumas secondary to an MVA. Current literature, clinical expertise, and patient preferences were used to help create the plan of care (POC). The outcomes of strength training, endurance training,

transfer training, balance training, and gait training interventions and their impact on the patient's functional impairments following a pelvic fracture were described in this report. The patient's age and extent of injury presented an interesting clinical challenge to rehabilitation, which is not commonly seen in the literature to date.

The purpose of this case report was to describe the outcomes of PT interventions for an elderly patient following an unstable pelvic ring fracture, and to provide an overview for a POC that is supported by prior research.

Patient History and Systems Review

The patient was a 99-year-old male who presented to PT following an MVA in which he was T-boned while driving through an intersection. The patient suffered comminuted bilateral superior and inferior pubic rami fractures, a left-sided zone II sacral fracture, multiple rib fractures, and an L5 transverse process fracture. The patient underwent surgical fixation in which he received an external fixation for the bilateral pubic rami fractures, and a percutaneous screw fixation of the sacral fracture.

Prior to admission to the subacute rehabilitation facility, the patient lived with his wife in a single level home with seven steps and railings on both sides to enter. The patient managed all household work and was his wife's primary caregiver. The patient was independent in all activities of daily living (ADL's) and functional mobility. He did not use an assistive device (AD) and was a limited community ambulator. His past medical history included stroke with uncontrolled hypertension and atrial fibrillation. The patient's past surgical history was insignificant. The patient's medication list can be found in Appendix A.

Before attending PT at the rehab facility, the patient participated in acute inpatient rehabilitation for three weeks. The surgical plan was for the patient to maintain the external fixator for six weeks post-surgery; however due to increased pain, the external fixator was removed after three weeks. With the hardware removal, the patient showed improvements in independence with functional transfers and functional mobility. The patient was transferred to the rehab facility to receive occupational therapy (OT) and PT 5-7 times per week. His primary concern regarding his prognosis was his left hip pain during movement as he believed it limited his functional mobility, decreased his ability to provide assistance for his wife, and increased his reliance on caregivers. The patient's goals were to reduce his pain, increase his strength, and return to home to care for his wife. The patient signed an informed consent to be the subject of this case report.

Examination – Tests and Measures

Findings from the history and systems review can be found in Table 1. Examination tests and measures were performed to further assess the patient's limitations and the results can be found in Table 2.

Manual Muscle Testing

The patient's LE strength was assessed using manual muscle testing (MMT). Muscle groups tested included hip flexors, hip abductors, hip adductors, quadriceps, hamstrings and gastrocnemius bilaterally. At the initial examination, this assessment was performed in the seated position due to the patient's difficulty performing bed mobility and positional changes. Research has shown that MMT is the most frequently used method to assess strength.[6] However, the test-retest coefficient was moderate 0.63, and the interrater reliability was poor ICC of 0.11 to 0.42.[6]

Numeric Pain Rating Scale

The patient's pain level was assessed via verbal response using the Numeric Pain Rating Scale (NPRS) with dialogue to express the level from 0-10, location, and description of pain. The patient's pain level was assessed at rest and again during movement. Pain is a subjective measurement and is therefore difficult to assess for accuracy.[7] However, research has shown that the NPRS is a valid pain assessment for post-operative patients when dialogue of location and description is included.[7]

Timed Up and Go Test

The Timed Up and Go Test (TUG), which consists of sit-to-stand and stand-to-sit transfers, ambulation, and turning, was used to assess the patient's gait, balance, functional mobility and screen for fall risk.[8] The TUG is a good assessment tool as it has a high sensitivity (87%) and high specificity (87%) when predicting the likelihood of falls.[8] At the initial evaluation (IE), the patient was unable to perform a sit-to-stand transfer without assistance, therefore rendering the test invalid. Although the test was invalid at the IE, the therapist anticipated the patient would make significant improvements and therefore retained the TUG as an outcome measure in the POC to compare his scores to normative values for his age.

Modified 30 Second Sit-to-Stand Test

The Modified 30 Second Sit-to-Stand Test (m30STS) was used to measure the patient's strength, functional mobility, and screen for fall risk.[9] The test measured how many times a patient can completely stand up and sit down within 30 seconds without physical assistance from another person.[9] The m30STS test allows patients to utilize their upper extremities to help them perform the transfer safely.[9] The m30STS showed a significant relationship $p=0.03$ between an increased number of repetitions of sit-to-stand transfers and its association with a decrease risk for falls.[9] The test was performed in the patient's wheelchair and the patient was given verbal

cues to use his arms to push up from the arms of the wheelchair to assist with the sit-to-stand transfer. At the IE, the patient was unable to perform a sit-to-stand transfer without physical therapist student assistance due to weakness, therefore the patient scored a "0".

2 Minute Walk Test

The 2 Minute Walk Test (2MWT), which is performed by measuring the distance a patient can ambulate within two minutes, assessed the patient's endurance and functional mobility.[10] Older adults generally have decreased activity tolerance.[10] Therefore, the 2MWT was chosen to be utilized as an outcome measure as it is a shorter measure for endurance than the 6-minute walk test (6MWT). The 2MWT has good test-retest reliability and interrater reliability of 0.94-0.95, as well as concurrent validity of $r \geq 0.84$ with the 6MWT.[10] The patient performed the test indoors on a hard even surface with a front wheeled walker (Drive Medical, Port Washington, NY) and contact guard assistance. The distance the patient ambulated was measured using a measuring wheel.

Clinical Impression: Evaluation, Diagnosis, Prognosis

The patient was four weeks status-post internal and external surgical fixation of a pelvic ring fracture with recent removal of external fixation. Tests and measures were performed to assess baseline function and to direct goal setting. Based on the results of the examination data, the patient's impairments can be found in Tables 1 and 2. The patient was a good candidate for a case report because there was limited literature on the PT management of unstable pelvic ring fractures in the geriatric population.

Diagnosis and Prognosis

The patient's primary medical and PT ICD-10 codes are listed in Table 3. The patient had good rehab potential as evidenced by positive prognostic factors including: high cognitive functioning; active participation in skilled treatment; high prior level of function (PLOF); high motivation to return to home; and his lack of associated neurological injury.[5] Negative prognostic factors included: the patient's advanced age; associated injuries stated previously; the extent of surgical fixation he underwent involving dissection of the muscles around the hip; increased pain during movement; generalized weakness; and his decreased scores on functional outcome measures at the IE.[4,5]

Plan of Care

The POC was created and adjusted as needed throughout the patient's length of stay (LOS) at the facility through coordination and communication between appropriate healthcare personnel. The patient's estimated LOS was three to four weeks. The patient received OT services to address impaired upper extremity strength and decreased ability to perform ADL's. PT interventions included: therapeutic exercise to improve strength; gait training to improve gait abnormalities; neuromuscular reeducation to improve static and dynamic balance; therapeutic activities to improve bed mobility and functional transfers; and cardiovascular endurance training to improve functional activity tolerance. PT interventions were progressed accordingly. Follow-up evaluations of outcome measures and goals were completed every seven days for two weeks. The patient actively participated in creating short-term goals (STGs) and long-term goals (LTGs) for PT based on his functional limitations as well as his personal goals for PT (see Table 4). A home evaluation was completed by a PT and an OT prior to the patient's discharge to ensure the patient's safety to return home to a least restrictive environment. Upon discharge, the

patient was referred for home health services to continue to address his decreased functional mobility and activity tolerance.

----------PART TWO----------

INTERVENTION AND PLAN OF CARE

Coordination, Communication & Documentation

The patient's care was coordinated between PT, OT, and nursing. PT and nursing treated the patient seven days a week and OT treated the patient five days a week. PT and OT worked together to coordinate the patient's schedule to ensure he had adequate rest between sessions to decrease the risk of fatigue. PT and OT coordinated with nursing to ensure the patient was receiving his pain medication prior to therapy with adequate time for the medication to be effective to optimize his participation in therapy sessions.

The patient's status, changes to the POC, and discharge plans were discussed at weekly meetings involving the therapists, the director of rehab, the director of nursing, patient care coordinators, and the executive director of the facility. Information was shared between disciplines on a daily basis through the patient's electronic therapy chart and an electronic medical record system.

PT documentation was recorded using the electronic documentation system Optima™ (Optima™, Bend, Oregon) including the IE, daily intervention notes, weekly progress reports, and the discharge summary.

Patient-related instruction

The POC was discussed and created with the patient. Patient-related education focused on the proper use of a front-wheeled walker (FWW), the importance of wearing pressure relief boots in bed to improve pressure ulcer on his heel,[11] sequencing techniques for functional transfers, proper gait pattern and posture during ambulation, balance recovery techniques, and safe sequencing during stair climbing.

Procedural Interventions

Procedural interventions were selected based on the patient's musculoskeletal and neuromuscular impairments and his functional limitations. Procedural interventions were modified throughout the episode of care (EOC) as the patient's functional impairments and limitations improved. The patient was seen for 60-90 minutes per session, seven sessions a week for 14 total PT sessions. The patient was compliant with attending all scheduled PT appointments and actively participated in each intervention. Details of interventions are found in Table 5.

Therapeutic Exercise

Therapeutic exercise was prescribed to increase muscle strength and endurance, to improve weight-bearing tolerance through bilateral LE's, and to improve the patient's functional activity tolerance to participate in daily tasks. Research has shown that progressive strength training can have positive effects on mobility, balance, and participation in ADL's.[12] Therapeutic exercises were progressed from supine to seated, and from seated to standing. At the start of treatment, LE strengthening exercises were performed in supine and the patient required active assisted range of motion with his left LE hip flexion. Throughout the EOC, the patient's overall active range of motion improved and the patient was able to perform seated LE strengthening exercises without assistance. The patient's strength continued to progress and he was able to perform advanced standing exercises including step ups and partial bodyweight squats. To build the patient's muscular endurance, repetitions of LE exercises were slowly increased throughout the POC as the patient tolerated. To improve his functional activity tolerance, the NuStep (NuStep, Ann Arbor, Michigan) was utilized with increasing resistance and duration of activity to improve endurance.

Therapeutic Activities

Therapeutic activities were prescribed to improve sequencing and safety of functional transfers and increase independence with bed mobility. At the IE, the patient demonstrated increased difficulty with bed mobility and sit-to-stand transfers requiring moderate assistance from staff to perform these

functional activities. To increase independence, bed mobility training included rolling, scooting, bridging, supine-to-sit, and sit-to-supine tasks with verbal cues of proper sequencing to help task completion. As the patient progressed, the level of assistance and amount of verbal cues were decreased. Transfer training began with wheelchair sit-to-stand transfers with verbal cues for hand placement and moderate assistance from the therapist to help the patient rise. When the patient demonstrated increased independence with the task, he progressed to transferring to and from surfaces of varying heights and firmness with modified independence and with decreased reliance on verbal cues for safety.

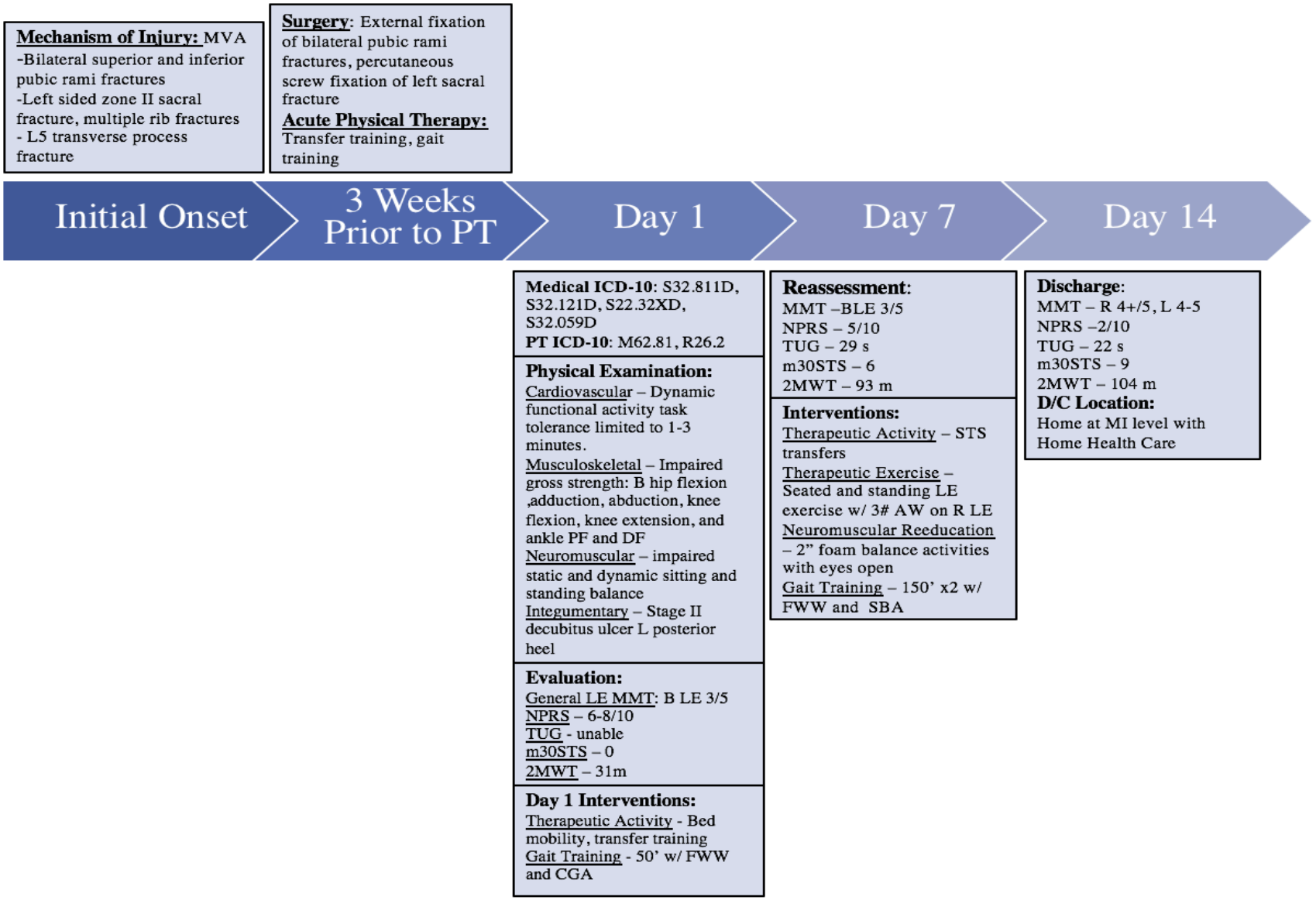
Gait Training

Gait training was prescribed to educate the patient on safe use of an AD, to improve gait pattern, increase gait speed, and to improve sequencing and safety of stair climbing in order for the patient to safely return home independently. The therapist provided patient education on proper walker management during gait on level surfaces and during transfers. At the IE, the patient had an impaired gait pattern and decreased gait speed. Research indicates that gait speed correlates to hospitalization and mortality.[13] Therefore, it was important to improve the patient's gait speed and ambulation independence to improve his functional mobility and decrease his functional limitations. Gait training interventions were focused on increasing the patient's stride length, step height, hip extension during terminal stance phase, and knee flexion during swing-through phase to normalize gait pattern,[14] and scanning the environment to decrease risk of falls. Throughout the EOC, the therapist decreased verbal cues provided and the patient demonstrated self-correcting techniques which indicated increased independence with ambulation. As the patient's functional mobility improved throughout the EOC, the therapist began stair training to help the patient return to his PLOF and to be able to enter his home. When the patient was discharged, he was able to ascend/descend two flights of stairs while using both upper extremities on railings, without rest breaks, and with occasional verbal cues from the therapist.

Neuromuscular reeducation

Neuromuscular reeducation was prescribed to improve righting reactions to decrease risk of falls, increase balance recovery techniques, and to improve motor control and coordination. Research has shown that balance training can help improve functional mobility, decrease pain, and improve the quality of life in older adults following hip fractures.[15] At the start of care, the patient's static standing balance was poor. To improve righting reactions and balance recovery techniques, balance training exercises were progressed throughout the EOC. The patient started with his feet apart and eyes open to provide the widest base of support and patient use of all three body systems that help maintain balance: the visual system, vestibular system, and proprioception. As the patient's balance improved, the exercises were progressed to decreased bases of support: feet together, modified tandem, and tandem stance, as well as reducing proprioception. Motor control and coordination exercises were implemented to improve quality and safety during the completion of varying tasks. Throughout the EOC, the exercises were progressed by increasing the number of extremities bilaterally involved in a task, as well as the accuracy needed to perform specific movements to help improve the patient's functional mobility and safety during functional activities.

TIMELINE


Mechanism of Injury: MVA
-Bilateral superior and inferior pubic rami fractures
-Left sided zone II sacral fracture, multiple rib fractures
- L5 transverse process fracture
Surgery: External fixation of bilateral pubic rami fractures, percutaneous screw fixation of left sacral fracture
Acute Physical Therapy: Transfer training, gait training
Initial Onset
3 Weeks Prior to PT
Day 1
Day 7
Day 14
Medical ICD-10: S32.811D, S32.121D, S22.32XD, S32.059D
PT ICD-10: M62.81, R26.2
Physical Examination:
Cardiovascular – Dynamic functional activity task tolerance limited to 1-3 minutes.
Musculoskeletal – Impaired gross strength: B hip flexion ,adduction, abduction, knee flexion, knee extension, and ankle PF and DF
Neuromuscular – impaired static and dynamic sitting and standing balance
Integumentary – Stage II decubitus ulcer L posterior heel
Evaluation:
General LE MMT: B LE 3/5
NPRS – 6-8/10
TUG - unable
m30STS – 0
2MWT – 31m
Day 1 Interventions:
Therapeutic Activity - Bed mobility, transfer training
Gait Training - 50' w/ FWW and CGA
Reassessment:
MMT –BLE 3/5
NPRS – 5/10
TUG – 29 s
m30STS – 6
2MWT – 93 m
Interventions:
Therapeutic Activity – STS transfers
Therapeutic Exercise – Seated and standing LE exercise w/ 3# AW on R LE
Neuromuscular Reeducation – 2" foam balance activities with eyes open
Gait Training – 150' x2 w/ FWW and SBA
Discharge:
MMT – R 4+/5, L 4-5
NPRS –2/10
TUG – 22 s
m30STS – 9
2MWT – 104 m
D/C Location:
Home at MI level with Home Health Care

OUTCOMES

The patient's outcomes were reassessed throughout the EOC on day seven and at discharge on day 14. The TUG, m30STS, and 2MWT improved consistently throughout the course of treatment. The patient's 2MWT improved by 73 meters from the IE to discharge (Table 2), which met the minimally clinical important difference (MCID) of 12.2 meters. The TUG does not have established MCID values, however the patient improved from the IE, in which he was unable to perform the TUG, to 22 seconds at discharge. Although a score of $\geq$ 12 seconds to complete the TUG indicates the patient is at risk for falling,[17] the patient demonstrated meaningful improvement as he was closer to achieving $\leq$ 12 seconds than he was prior to treatment. The patient improved his m30STS test score from zero to nine chair rises from IE to discharge. Nine chair rises is above average for the patient's age group (5.8).[18] The patient's strength improved greatly from baseline measurements, with full strength demonstrated in all areas except for left hip flexion (4-/5). The patient demonstrated a progressively improved gait pattern throughout the course of treatment. The patient's gait pattern and deviations at IE and discharge are found in Table 2. The patient continued to demonstrate inadequate pelvic rotation due to residual pain from injury, decreased stride length due to hip flexor weakness, and flat foot during weight acceptance on the left LE due to his pain with heel strike caused by the pressure ulcer on his left heel.

The patient participated in therapy for 14 consecutive days and fully adhered to the interventions. The patient met four out of five STGs and three out of five LTGs (Table 4). The patient was closely monitored through daily NPRS pain assessments and rate of perceived exertion evaluations. The patient tolerated treatment as demonstrated through his responses on these daily subjective measurements. No additional follow-up diagnostic tests were needed. No

adverse or unanticipated events occurred throughout the EOC.

DISCUSSION

This case report demonstrated its intended purpose as it documented the outcomes of PT management for a 99-year-old patient with an unstable pelvic ring fracture. The findings of this case report were compatible with the literature which has shown that strength training, gait training, and progressive resistive exercise training interventions are beneficial in improving overall functional mobility for patients with pelvic ring fractures.[5] Following a course of 14 consecutive treatment sessions, the patient in this case report exhibited improvements in functional transfers and mobility, bilateral LE strength, gait activities, and balance activities. The patient was able to be discharged home at the modified independent level and returned to community ambulation distances. The patient appeared to have benefitted from the rehabilitation program with regards to his improvement in functional mobility and transfers, bilateral LE strength, gait pattern and ambulation distances, and static and dynamic balance.

The limitations in this case report were the patient's left hip pain which decreased his tolerance for left LE strength training and therefore affected his ability to regain full hip flexion strength. Additionally, the patient was battling a stage II pressure ulcer on his left posterior heel which caused gait deviations and decreased ambulation distances compared to his PLOF as it was painful for him to heel strike on the left foot. The strengths of this case report were that the patient was compliant with all 14 consecutive treatment sessions and he was highly motivated to achieve his goals, return home, and to regain his PLOF.

This was a rare case as the patient was of an extreme age of 99 years old, which has not been commonly reported to date in the literature. Although this patient was elderly, prior to his

accident he had a high PLOF as he lived independently, was able to drive, and was a community ambulator. However, due to his extreme age, in order to achieve his goals he had to overcome many obstacles including the severity of his injury, increased risk of mortality,[2,3] and decreased likelihood of returning home.[19] Despite these trialing obstacles, the patient demonstrated that neither age nor severity of injury are sole predictors of prognosis. This particular patient demonstrated why we, as clinicians, should suspend all bias while treating a patient of any age and with any diagnosis.

As the elderly population ages, further research on the normative values for functional outcome measures in the nonagenarian population would be beneficial in determining such a patient's rehabilitation progress. Additionally, future research may focus on specific treatment interventions that are beneficial for patients with pelvic ring fractures.

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TABLES

Table 1. Systems Review

Systems Review	
Cardiovascular/Pulmonary	Indicators present from PMH. BP at Rest: 149/79. Activity tolerance for dynamic functional task limited to 1-3 minutes.
Musculoskeletal	Impaired Gross Strength: bilateral hip flexion, adduction, abduction, bilateral knee flexion and extension, and bilateral ankle plantarflexion and dorsiflexion. ROM:WFL
Neuromuscular	Impaired gait, Impaired static and dynamic sitting and standing balance, Impaired movement patterns with transfers
Integumentary	Stage II decubitus ulcer on left posterior heel
Communication	Not impaired
Affect, Cognition, Language, Learning Style	English. Patient's preferred learning style includes demonstrations and pictures with instructions due to hearing deficits. No cognitive and affect impairments.

PMH=past medical history, BP=blood pressure, ROM=range of motion, WFL=within functional limits

Table 2. Tests and Measures

Tests & Measures	**Initial Evaluation Results**		**Progress Report Day 7**		**Final Evaluation Day 14**	
Lower Extremity MMT	Left	Right	Left	Right	Left	Right
Hip Flexion	3/5	3+/5	3/5	3+/5	4-/5	4+/5
Hip Abduction	3+/5	3+/5	3+/5	4/5	4+/5	4+/5
Hip Adduction	3+/5	3+/5	3+/5	4/5	4+/5	4+/5
Knee Flexion	3+/5	4-/5	4/5	4/5	4+/5	5/5
Knee Extension	3/5	3+/5	4/5	4+/5	4+/5	5/5
Ankle Plantarflexion	4-/5	4-/5	4/5	4/5	5/5	5/5
Ankle Dorsiflexion	4/5	4/5	4+/5	4+/5	4+/5	5/5
Numeric Pain Rating Scale	6/10 at rest, 8/10 with movement		2/10 at rest, 6/10 with movement		0/10 at rest, 1/10 with movement	
Balance	**Static sitting:** Fair+ **Dynamic sitting**: Fair **Static standing**: Fair– **Dynamic standing**: Poor+		**Static sitting:** Good **Dynamic sitting**: Good– **Static standing:** Fair+ **Dynamic standing:** Fair		**Static sitting**: Good+ **Dynamic sitting**: Good+ **Static standing**: Good **Dynamic standing**: Good–	
Gait Pattern and Deviations	-Flat foot during weight acceptance bilateral -Absent push-off -Inadequate hip extension -Inadequate pelvis rotation -Decreased stride length -Decreased velocity -Inadequate toe clearance -Forward lean of trunk on FWW.		-Flat foot during weight acceptance on left -Limited push-off -Inadequate hip extension - Inadequate pelvis rotation -Decreased stride length -Inadequate toe clearance -Forward lean of trunk with excessive use of UEs on FWW		-Flat foot during weight acceptance on left -Adequate push-off - Adequate hip extension - Inadequate pelvis rotation -Improved, but decreased stride length -Improved gait velocity -Adequate toe clearance -Upright posture while ambulating with FWW	
Timed Up and Go Test	Pt unable to perform without assistance		29 seconds		22 seconds	
Modified 30 Second Chair Rise Test	0. Normative values for men aged 90 and older is 5.8 chair rises within 30 seconds.[18]		6 chair rises		9 chair rises	
2 Minute Walk Test	31 m with FWW and CGA. Normative values for retirement dwelling older adults with an average age of 87 years old is 150 m.[16]		83 m		104 m	

MMT=manual muscle test, FWW=front wheeled walker, m=meters, CGA=contact guard assistance

Table 3. Medical and Physical Therapy Diagnoses

Medical ICD-10 Code[20]	**Description:**
S32.811D	Multiple fracture of pelvis with unstable disruption of pelvic ring, subsequent encounter for fracture with routine healing
S32.121D	Minimally displaced Zone II fracture of sacrum, subsequent encounter for fracture with routine healing
S22.32XD	Fracture of one rib, left side, subsequent encounter for fracture with routine healing
S32.059D	Unspecified fracture of fifth lumbar vertebra, subsequent encounter for fracture with routine healing
PT ICD-10 Code[20]	**Description:**
M62.81	Muscle weakness (generalized)
R26.2	Difficulty in walking, not elsewhere classified.

Table 4. Short-Term and Long-Term Goals

Short-Term Goals: 1 week	Goal Met	Long-Term Goals: 3 weeks	Goal Met
1. Patient will safely perform functional transfers with CGA and 25% verbal cues for correct hand/foot placement with ability to right self to achieve/maintain balance in order to decrease level of assistance from caregivers and return to PLOF abilities.	Yes	1. Patient will safely perform functional transfers with MI and 0% verbal cues for correct hand/foot placement with ability to right self to achieve/maintain balance in order to decrease level of assistance from caregivers and return to PLOF abilities.	No
2. Patient will enhance functional mobility as evidence by a decreased (improved) score on the TUG to 60 seconds.	Yes	2. Patient will enhance functional mobility as evidence by a decreased (improved) score on the TUG to 30 seconds.	Yes
3. Patient will demonstrate improved functional capacity as evidenced by an improved score on the Modified 30 Second Sit-to-Stand to 2.	Yes	3. Patient will demonstrate improved functional capacity as evidenced by an improved score on the Modified 30 Second Sit-to-Stand to 8.	Yes
4. Patient will improve ability for functional dynamic activity as evidenced by an improved score on the 2MWT to 50 meters.	Yes	4. Patient will improve ability for functional dynamic activity as evidenced by an improved score on the 2MWT to 100 meters.	Yes
5. Patient will safely perform bed mobility tasks with SBA and occasional verbal cues for roper sequencing in order to get in/out of bed.	No	5. Patient will increase BLE Strength to 4+/5 to facilitate improved functional mobility and ambulation to be able to safely return home.	No

CGA=contact guard assistance, PLOF=prior level of function TUG=timed up and go test, 2MWT= two minute walk test, SBA= stand by assistance, MI= modified independence, BLE=bilateral lower extremity

Table 5. Procedural Interventions.

Rx Day	Therapeutic Exercise	Therapeutic Activity	Gait Training	Neuromuscular Reeducation
1		**Transfers:** -sit to stand w/ FWW and Min A. **Bed Mobility**: -rolling, scooting and supine to sit w/ railing and Mod A	**Patient education:** -proper hand placement on walker -walker management during ambulation -walker management during turns **Ambulation:** -50' x1 with FWW and CGA	
2	**Supine Exercise:** - hip abduction - hip adduction - heel slides - SAQ 2 set x 10 reps of AROM BLE **Chair squats:** - 2 set x 5 reps w/ use of UE's	**Bed Mobility:** -rolling, scooting and supine to sit w/ railing and Mod A	**Ambulation:** - 50'x2 with FWW and CGA w/ seated rest break	**Static standing balance** w/o use of FWW: - feet apart, eyes open - feet apart, eyes closed - feet together, eyes open - feet together, eyes closed
3	**Supine Exercise:** - hip abduction - hip adduction - SAQ 2 set x 10 reps of AROM BLE with 3# AW R LE and 0# on L LE **Seated Exercise:** - hip flexion marches 2 set x 10 reps of AAROM on L LE, AROM on R LE w/ 3# AW on R LE and 0# on L LE	**Bed Mobility:** - supine to sit with railing and Min A	**Ambulation**: - 100' with FWW and CGA w/o rest break	**Static standing balance** w/o use of FWW: - feet apart, eyes open - feet apart, eyes closed - feet together, eyes open - feet together, eyes closed - Modified tandem with R LE in back, eyes open - Modified tandem with R LE in back, eyes closed
4	**Seated Exercise:** - hip flexion marches - LAQ - hamstring curls 2 set x 10 reps of AROM on L LE and AROM on R LE for marches, AROM on R and L LE for hamstring curls and LAQ's. 3# AW on R LE, 0# on L LE, and red tband for hamstring curls	**Bed Mobility**: - supine to sit and bridging with railing and Min A	**Ambulation:** - 100' x1, 75'x1 with FWW and SBA w/ seated rest break	
5	**Seated Exercise:** -hip flexion -LAQ - hamstring curls - hip abduction -hip adduction 2 set x 15 reps of AROM on R LE and L LE, 3# AW on R LE, 0# on L LE, red tband **Endurance Exercise:** Closed Chain B UE & LE PRE Level 1, 8 minutes	**Transfers:** - sit to stand/stand to sit with FWW and CGA	**Ambulation:** -150'x1, 50'x1 with FWW and SBA with seated rest break	

Rx Day	Therapeutic Exercise	Therapeutic Activity	Gait Training	Neuromuscular Reeducation
6	**Seated Exercise:** - hip flexion - LAQ - hamstring curls - hip abduction - hip adduction 3 set x 10 reps of AROM on BLE, 3# AW on R LE, 0# on L LE, red tband	**Transfers**: - sit to stand w/ FWW and CGA	**Ambulation:** - 200' x1, 50'x1 w/ FWW and SBA with seated rest break.	**Standing Balance** on 2" foam: - feet apart, eyes open - feet together, eyes open - modified tandem, eyes open With CGA
7	**Standing Exercise:** - heel raises - hip abduction - hip flexion 2 set x 15 reps of AROM BLE **Chair Squats**: -3x5 w/ use of UE's to rise/descend	**Bed Mobility:** - supine to sit w/ railing and CGA	**Ambulation:** - 150 x 2, 50'x 1 w/ FWW and SBA with seated rest break.	
8	**Standing Exercise:** - heel raises - hip abduction - hip flexion - hip extension 2 set x 15 reps of AROM BLE **Step ups:** - 6" step 3 set x 5 reps with FWW **Chair Squats:** 3x5 w/ use of UE's to rise/descend		**Ambulation:** - 200'x1, 150'x1 with FWW and SBA w/ seated rest break	**Static standing balance** w/o use of FWW: - feet apart, eyes open - feet apart, eyes closed - feet together, eyes open - feet together, eyes closed - Modified tandem with R LE in back, eyes open - Modified tandem with R LE in back, eyes closed - Tandem stance with R LE in back, eyes open - Tandem stance with R LE in back, eyes closed
9	**Seated Exercise:** - hip flexion - LAQ - hamstring curls - hip abduction - hip adduction 3 set x 10 reps of AROM on R and L LE, 3# AW on R LE, 2# AW on L LE, red tband **Endurance exercise:** Closed chain B UE and LE PRE Level 1, 12 min	**Bed Mobility:** - supine to sit w/ railing and SBA	**Ambulation:** - 300' x1, 100'x1 with FWW and SBA w/ seated rest break	
10	**Standing Exercise:** -heel raises -hip flexion - hip abduction - hamstring curls 3 set x 10 reps of AROM on R LE and L LE **Endurance exercise:** Closed chain B UE and LE PRE Level 2, 10 min	**Transfers:** - sit to stand/stand to sit from surfaces of different heights and firmness with SBA	**Ambulation:** - 400'x1 with FWW and SBA w/o seated rest break	

Rx Day	Therapeutic Exercise	Therapeutic Activity	Gait Training	Neuromuscular Reeducation
11	**Seated Exercise:** - hip flexion - LAQ - hamstring curls - hip abduction - hip adduction 3 set x 10 reps of AROM on BLE, 3# AW on R LE, 2# on L LE, green tband **Endurance exercise:** Closed chain B UE & LE PRE Level 1, 10 min Level 2, 5 min	**Transfers:** - sit to stand/stand to sit transfers on surfaces of varying heights and firmness	**Ambulation**: - 200' x3 w/ FWW and SBA with seated rest breaks.	**Standing Balance:** - Modified tandem, eyes open -Modified tandem, eyes closed -Tandem, eyes open -Tandem, eyes closed -SLS on R LE, eyes open
12	**Standing Exercise:** -partial squats - hip flexion - hamstring curls - heel raises - hip abduction 3 set x 10 reps of AROM BLE **Endurance exercise:** Closed chain B UE & LE PRE Level 2; 8 min Level 3; 4 min	**Bed Mobility:** - supine to sit/sit to supine w/o railing with SBA	**Ambulation:** - 200' x3, w/ FWW and SBA with seated rest breaks.	**Standing Balance:** -Tandem, eyes open -Tandem, eyes closed - SLS on R LE, eyes open
13	**Standing Exercise:** - hip flexion - hip extension - heel raises - hip abduction 3 set x 10 reps of AROM BLE **Step ups:** - 6" step 3 set x 10 reps with FWW **Endurance exercise**: Closed chain B UE & B LE PRE Level 2; 5 min Level 3; 8 minutes	**Bed Mobility:** - supine to sit/sit to supine w/o railing with SUP	**Ambulation:** - 400'x1 with FWW and SUP w/o seated rest break	**Standing Balance:** - SLS on R LE, eyes open - SLS on R LE, Eyes closed
14	**Standing Exercise:** - hip flexion - hip extension - heel raises - hip abduction 3 set x 10 reps of AROM on BLE **Endurance exercise:** Closed chain B UE & LE PRE Level 3; 12 minutes	**Bed Mobility:** - supine to sit/sit to supine w/ MI	**Stair Training:** - 4 sets x 1 rep of 12 stairs per flight with use of bilateral railings and SUP	**Standing Balance** on 2" Foam: - heel raises - partial squats - SLS on R LE, eyes open

FWW= front wheeled walker, Min A=minimum assistance, Mod A=moderate assistance, CGA= contact guard assistance, SBA=stand by assistance, SUP=supervision assistance, MI=modified independence, SAQ=short arc quad set, LAQ= long arc quad set, SLS=single leg stance, AROM=active range of motion, AAROM=active assisted range of motion, R=right, L=left, LE=lower extremity, UE=upper extremity, B = bilateral, AW=ankle weight, tband=theraband, PRE=progressive resistive exercise

APPENDICES

Appendix A. Medication List

Medication	Dosage	Indication
Apixaban	5mg 2x/daily	For prevention of blood clots
Cardizem	60mg 4x/daily	For hypertension
Docusate-senna	50 mg-8.6 mg 3x/daily	For stool
Doxycycline	100 mg 2x/daily	For bacteria
Lactobacillus Rhamnosus GG	1 capsule daily	For stool
Melatonin	3mg daily	For insomnia
Oxycodone	5 mg 3x/daily prn	For pain
Polyethylene glycol	17 g 2x/daily prn	For stool

mg=milligrams, prn=as per needed

CARE Checklist

Final Parts One & Two, PTH708: Completed for the final submission to document the locations of key case report components.

CARE Content Area	Page
1. **Title** – The area of focus and "case report" should appear in the title	1
2. **Key Words** – Two to five key words that identify topics in this case report	1
3. **Abstract** – (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
4. **Introduction** – Briefly summarize why this case is unique with medical literature references.	3
5. **Patient Information** 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
6. **Clinical Findings** – Relevant physical examination (PE) and other clinical findings	5-9, 20-21
7. **Timeline** – Relevant data from this episode of care organized as a timeline (figure or table).	13
8. **Diagnostic Assessment** a. Diagnostic methods (PE, laboratory testing, imaging, surveys). b. Diagnostic challenges. c. Diagnostic reasoning including differential diagnosis. d. Prognostic characteristics when applicable.	8, 22
9. **Therapeutic Intervention** a. Types of intervention (pharmacologic, surgical, preventive). b. Administration of intervention (dosage, strength, duration). c. Changes in the interventions with explanations.	10-12, 23-25
10. **Follow-up and Outcomes** 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.	13-14
11. **Discussion** 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.	14-16
12. **Patient Perspective** – The patient can share their perspective on their case.	5
13. **Informed Consent** – The patient should give informed consent.	5