2016

Physical Therapy for a Female with Acute Stroke: A Case Report

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PHYSICAL THERAPY FOR A FEMALE WITH ACUTE STROKE: A CASE REPORT

by

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A Scholarly Project Submitted to the Graduate Faculty of the

Department of Physical Therapy

School of Medicine

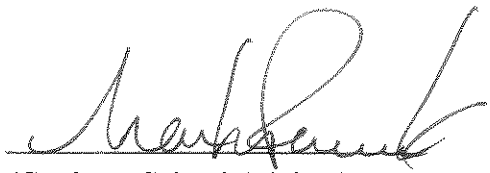
University of North Dakota

in partial fulfillment of the requirements for the degree of

Doctor of Physical Therapy

Grand Forks, North Dakota
May, 2016

This Scholarly Project, submitted by Lisa Grandpre in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.



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ABSTRACT

Background and Purpose: Strokes are the 5th leading cause of death and adult disability in the US. Strokes affect each individual differently, some individuals more severely than others. The goal of physical therapists is to come up with the best treatment plan for each individual in order to restore as much function as possible.

Case Description: The patient was a Caucasian female in her 80s who suffered a stroke while in the hospital. She was living in assisted living prior to her hospital stay and was functional in the home only. The passive range of motion in her left extremities was within normal limits, with tone flaccid. We were unable to assess the strength of her left extremities. She required 2-person, maximal assistance for transfers and minimal assistance for static sitting during our early visits.

Intervention: Patient education, therapeutic exercise, bed mobility, balance and transfer training, and wheelchair mobility training were some of this patient's interventions.

Outcomes: The patient had 18 physical therapy sessions. She was able to increase her static standing time from 15 to 20 seconds to 30 to 40 seconds. Her sitting trunk control increased and her bed mobility went from a 2 person maximal assistance to a 1 person maximal assistance by her discharge.

Discussion: Research on acute stroke patients is limited. Most research focuses on subacute and chronic stroke patients. Our patient had minimal improvements after 16 days in the hospital and was discharged to a nursing home with both physical and occupational therapy recommended.

CHAPTER I

BACKGROUND AND PURPOSE

Approximately 795,000 people have a stroke each year.[1] About 77% of these are first attacks. To put this in another perspective, on average, every 40 seconds, someone in the United States has a stroke. Women have a higher lifetime risk of stroke than men (1 in 5 vs 1 in 6). A stroke happens when part of the brain's blood supply is reduced or blocked (ischemic stroke) or there is a ruptured blood vessel (hemorrhagic stroke).[2] Ischemic strokes make up approximately 85% of all strokes. Stroke is ranked 5th among all causes of death and on average one American dies of a stroke every 4 minutes.[3] It is also the leading cause of adult disability in the United States, although approximately 80% of strokes can be prevented.[4]

Strokes are diagnosed based on a patient's signs and symptoms, medical history, physical exams and test results which usually include CT scans and MRIs of the brain.[5] Each year more women than men die from a stroke due to a larger number of living elderly women.[1] Those at a higher risk for having a stroke include older adults, African-Americans, people with lower levels of education, and those who live in the southeastern part of the United States. Stroke risk factors include high blood pressure, diabetes mellitus, disorders of heart rhythm, high blood cholesterol and lipids, smoking, physical inactivity, nutrition, family history, and chronic kidney disease. 2010 data show that the average length of stay for discharges with stroke as the primary diagnosis was 6.1 days. In 2011 the combined direct and indirect cost of stroke was $33.6 billion, with $17.5

billion being the estimated direct medical cost. The purpose of this case report is to compare the treatment of a stroke patient in an inpatient setting with different kinds of interventions for stroke rehabilitation.

Constraint-induced movement therapy for the arm is one treatment intervention used for stroke patients. One study looked at effects of sling and voluntary constraint-induced movement interventions.[6] Forty-seven stroke patients were randomly assigned into the two treatment categories. The intervention for both groups included practice with the affected arm (5 hours/day for 15 days) and both groups had an additional individual one hour physiotherapy session. The sling constraint group used hemislings to immobilize their nonaffected arm during therapy. Main measurements for the study included the Rivermead Motor Assessment Arm Scale and the Motor Activity Log – Quality of Movement. The results of the study showed that there was no significant difference between the two intervention groups after three weeks of therapy. Both groups showed great improvements in functional abilities of their arm, with the voluntary constraint group having a slightly higher effect. After 12 months there was no significant difference between the two groups in all data comparisons. Thrane et al[7] completed a meta-analysis on constraint-induced movement therapy after a stroke. They found a small effect size of for the effect of constraint-induced movement therapy on arm motor function and a moderate effect size for the effect of constraint-induced movement therapy on arm motor activities immediately after treatment and 3 to 6 months following treatment.

Mirror Therapy is another treatment intervention used for stroke patients. Samuelkamaleshkumar et al[8] explored the effectiveness of mirror therapy used in

combination with bilateral arm training. Twenty participants were split into either the mirror therapy group or the control group. Both groups received conventional occupational, physical, and speech therapy for 6 hours/day, 5 days/week, for 3 weeks. The mirror therapy group received an additional one hour of mirror therapy. Main measures used in this study were the Upper Extremity Fugl-Meyer Assessment, Brunnstrom Stages of Motor Recovery for the Arm and Hand, Box and Black Test for Gross Hand Dexterity, and the modified Ashworth Scale for Spasticity. The results of the study showed that after 3 weeks the mirror therapy group had significant improvement in the Fugl-Meyer Assessment ($p = .005$), Brunnstrom Stages of Motor Recovery for the Arm ($p = .001$) and Hand ($p = .02$), and the Box and Block Test ($p = .02$). The control group only showed significant improvement in the Fugl-Meyer Assessment ($p = .01$) and the Brunnstrom Stages of Motor Recovery for the Arm ($p = .004$). There was no significant difference found in the scores for the modified Ashworth scale of both groups after the three weeks.

Trunk exercises are another important aspect for recovery in stroke patients. A study looked at whether or not trunk exercises improved balance and mobility in stroke patients.[9] Thirty-three participants were randomly sorted into either the experimental or control group. Both groups received conventional physical and occupational therapy. The experimental group received an additional 16 hours of trunk exercises while the control group received an additional 16 hours of upper extremity exercises. The 16 hours were spread out over 8 weeks with the patient receiving the additional therapy 4 times per week for 30 minutes each. Measures used include the Trunk Impairment Scale (truncal function), Tinetti Test (standing balance and mobility), the Romberg with eyes

open/closed, Four Test Balance Scale, Berg Balance Scale, Rivermead Motor Assessment Battery, Functional Ambulation Categories, and Dynamic Gait Index. The results of the study show that both groups improved significantly on all outcome measures over the 8-week time period. There was a treatment effect found for the experimental group on the Trunk Impairment Scale, Tinetti Test, Four Test Balance Scale, Berg Balance Scale, Rivermead Motor Assessment Battery, and the Dynamic Gait Index.

The Berg Balance Scale (BBS) is a balance assessment that shows strong reliability and validity.[10] The interrater reliability was found to be excellent with an intraclass correlation coefficient (ICC) of .97 and an intrarater reliability ICC of .97. Excellent convergent validity was found between the BBS and the Barthel Index ($r = .88$) and the BBS and the Functional Independence Measure ($r = .76$). The Barthel Index and the Functional Independence Measure are tools to measure a patient's disability and the amount of assistance needed to complete different tasks. The BBS can be used as a predictor for length of stay at a hospital with a negative correlation ($r = -.46$). This article shows that the BBS is an excellent assessment tool to measure a patient's function after a stroke.

CHAPTER II

CASE DESCRIPTION

Evaluation, Examination and Diagnosis

The patient was a Caucasian female in her 80s who came to the emergency room after she had fallen out of bed and injured her right shoulder and bumped her head. She displayed weakness in her left arm and leg. The first MRI of the brain was negative, as was the CT scan of the brain. The patient was placed under observation and physical therapy (PT) was ordered to evaluate and treat the patient. She was retired and lived alone in an assisted living apartment with her cat. Her husband had died recently and she had moved from her house to the apartment shortly afterwards. She was right handed and the only activity of daily living (ADL) that she required assistance for was bathing. The patient usually sponge bathed with the help of her niece to wash areas she could not reach. The instrumental activities of daily living (IADLs) that required assistance were grocery shopping, meal preparation, home management, personal finances, and laundry. She had a niece who assisted with the laundry, shopping, and taking to appointments. Her past medical history included recent memory loss, a myocardial infarction in 2012, and a history of congestive heart failure, coronary artery disease, hypertension, deep vein thrombophlebitis, chronic obstructive pulmonary disease, pneumonia, degenerative joint disease, and breast cancer. The patient smoked 2 to 3 cigarettes a day.

The patient no longer drove and her gait level prior to admission was functional in the home only and she did not use an assistive device. She was blind in the left eye and

had decreased vision in the right eye. Her hearing was within functional limits (WFL) and she was on 2 liters of oxygen at home during the day and at night. She had fallen in the last 30 days, causing her tailbone to become bruised and painful. Her right upper and lower extremity active range of motion (AROM) was WFL and her left upper and lower extremity AROM was impaired. Her left upper and lower extremity passive range of motion (PROM) was WNL, but flaccid. The patient's gross strength was WFL for the right upper and lower extremity and we were unable to assess the left side due to flaccidity. The patient was taking Lipitor which can cause unexplained muscle pain and weakness.[11]

Prognosis and Plan of Care

The patient's problem list included decreased activity tolerance, balance impairment, decreased strength, impaired functional mobility, and abnormal tone. The PT diagnosis was the practice pattern 5D: Impaired Motor Function and Sensory Integrity Associated with Non-progressive Disorders of the Central Nervous System – Acquired in Adolescence or Adulthood. The ICD-9 code was 434.91 for cerebral artery occlusion, unspecified with cerebral infarction. The patient's treatment frequency was twice a day Monday through Friday, daily Saturday, and her hospital stay duration was 14 days with treatment being a total 60 minutes per day. The short term goals were: 1) patient will sit with supervision for 5 minutes on a firm mat, 2) patient will transfer sit to stand with moderate assist, 3) patient will complete bed mobility with maximal assist of 1 person, and 4) patient will stand for 2 minutes with maximal assistance. Discharge criteria for the patient were being strong enough and medically stable in order to be transferred to a long term care facility. The plan of care for the patient included neuromuscular re-education,

balance training, bed mobility training, patient education, equipment use, therapeutic exercises, gait training, transfer training, and wheelchair mobility training. No long term goals were made with this patient due to her only having a short stay in the hospital.

CHAPTER III

INTERVENTIONS

When we entered the room for the first therapy session the patient was complaining of a "weird" feeling on the left side of her face. She stated that she could not close her left eye and when asked to do so she was unable, but when she blinked, her left eye closed. She started to feel worse and complained of dizziness and a "heavy, wobbly" head. The patient reported difficulty speaking and left sided weakness; we immediately notified the registered nurse (RN). The RN was present during most of the physical therapy evaluation. The patient was alert and oriented to person, place, and time and was able to converse well. The patient was sitting in the chair, but with the help of the RN we transferred the patient back to bed due to her symptoms. For this transfer the patient required maximal assistance to transfer from a sit to stand position and then maximal assistance to complete a standing pivot transfer to the bed. Both transfers required minimal amount of verbal cues. A 2-person, moderate assistance was needed to transfer her from a sit to supine position with minimal amount of verbal cues. Before lying down the patient required minimal assistance to sit balanced at the edge of the bed since she tended to lean to her left. Because of the patient's symptoms, the RN notified the hospitalist on staff. Our therapy session was shortened due to the patient going to have tests done because of her CVA symptoms.

The next day we saw the patient and transferred her from the chair to the bed. The sit to stand and the standing pivot transfer both required a 2-person, maximal assistance

with maximal verbal and manual cues. The supine to sit transfer required a 2-person, maximal assistance with moderate verbal and manual cues. After the transfer, the patient sat at the edge of bed for 5 minutes with minimal to moderate support provided to maintain midline. While in the supine position the patient completed left quadriceps sets and was able to get a minimal quadriceps contraction. PROM was performed to the left LE in all the planes with 10 repetitions each. On day three, the patient was again transferred from the chair to the bed requiring 2-person, maximal assistance for the sit to stand transfer and standing pivot transfer. The left LE required blocking to prevent it from slipping forward and the knee from buckling. The patient completed static standing for 1.5 minutes twice using a hemi walker and 2-person, maximal assistance. The patient was cued to maintain an upright posture and to look up. She also performed right LE seated exercises (hip flexion, long arc quad [LAQs], hip abduction and adduction, and ankle pumps) with contact guard assistance (CGA) for 1 set of 10 repetitions and moderate verbal cues given. We applied manual resistance with hip abduction and adduction. PROM was performed with the left LE in all the available planes for 1 set of 10 repetitions. The next day also included transfers and LE exercises with the same level of assistance as the previous day.

The patient was then transferred to swing bed in order to get stronger before being discharged to a long term care facility. While in swing bed the patient performed bed mobility training, transfer training, LE exercises, static and dynamic sitting balance training, static standing, and wheelchair training. The patient required a 2-person, maximal assistance at the beginning of her swing bed stay, and by the time she was discharged she required a maximal assistance of 1-person. She had no change in transfer

assistance needed during the swing bed stay. She required a 1-person, maximal assistance for sit to stand transfers and a 2-person, maximal assistance for standing pivot transfers. The only difference was that she went from requiring maximal verbal and manual cues to moderate by her discharge from swing bed. The patient continued to progress with LE exercises (LAQs, marching, knee flexion, ankle pumps, trunk rolls, bridges, short arc quad [SAQs], hip internal and external rotation, heelslides, hip abduction and adduction) and by the end of her swing bed stay she performed PROM to active assistive range of motion (AAROM) for left LE exercises. With right LE exercises a 1-lb weight and an orange theraband was used for resistance. Exercises were performed with 1 set of 10 to 20 repetitions. The patient was able to perform a static sit (ranged from 6 minutes to 12 minutes each) with standby assistance (SBA) and dynamic sit with CGA while she reached out for things. The patient's static standing progressed from standing 3 times for 15 to 20 seconds each to standing 2 times for 30 to 40 seconds each with maximal assistance by the time she was discharged. While completing static standing a tall mirror was placed in front of the patient so she could see what her posture looked like and allowed her to focus on keeping herself upright. A hemi-height wheelchair was used to train the patient with a right hemi-propulsion technique. Minimal assistance was needed for wheelchair (WC) mobility which included equipment/device management cues and technique cues (turns and steering). A moderate amount of verbal cues were used for WC training. The patient was able to propel herself at least 100 feet by the time she was discharged. A previously mentioned reference also addressed using truncal exercises to improve balance. The mirror therapy article mentioned earlier could be used as a

reference to go along with the static standing the patient did with a tall mirror in front of her so she could see her flexed posture and adjust as needed.

CHAPTER IV

OUTCOMES

The patient was greatly motivated to participate in therapy each day. She had some slight improvement with the left LE exercises. She went from being totally dependent for those exercises to maximal assistance, but she still needed PROM to AAROM to complete the left LE exercises. The patient increased her static standing time from 15 to 20 second to 30 to 40 seconds with maximal assistance by the time of her discharge. She was able to increase her bed mobility to where she required a 1-person, maximal assistance instead of a 2-person, maximal assistance by the time she was discharged. Her sitting balance also improved throughout her therapy sessions. She went from initially needing minimal assistance to being able to perform static sitting (ranged from 6 to 12 minutes) and dynamic sitting with SBA by her discharge.

The patient was taught using verbal explanations and demonstrations and she was able to perform with some reinforcement/assistance. Overall the patient stayed in swing bed for 7 days before being discharged to a nursing home with physical therapy and occupational therapy being recommended services. The patient did not meet all her short term goals before her discharge. She met the goals of being able to sit with supervision for 5 minutes on a firm mat and being a 1-person maximal assistance for bed mobility before being discharged. The goals she did not meet were these: patient will transfer sit to stand with moderate assistance and the patient will stand for 2 minutes with maximal assistance.

Risk reduction for stroke includes quitting smoking, eating healthier diets, performing daily physical activity, controlling blood pressure, and managing diabetes. Compliance with these can help reduce a person's risk of having a stroke. Controlling alcohol use, knowing cholesterol levels, and having atrial fibrillation identified are other ways to help prevent a stroke. The mnemonic FAST is taught to help recognize signs of a stroke. The "F" stands for face and asking the patient to smile and see if one side of the face droops.[12] The "A" stands for arms and asking the patient to lift both arms to see if one drifts downward. The "S" stands for speech and asking the person to talk to see if their speech is slurred or strange. Finally the "T" stands for time and making the call to 9-1-1 if you see anyone with stroke signs.

CHAPTER V

DISCUSSION

There were minimal results for the patient when it came to left LE active movement. She started to have some slight muscle contractions, but the exercises were mostly PROM or AAROM for the left LE. The patient was in the hospital for a total of 16 days with 7 of them being in swing bed. She had 18 total 30-minute physical therapy sessions with 11 of them being in swing bed. While staying in swing bed, the patient received 60 minutes of physical and occupational therapy each per day and also received speech therapy. Physical therapy focused on ROM and strengthening of the lower extremity, while occupational therapy focused on ROM and strengthening of the upper extremity and ADLs.

Since the patient's stroke was acute we did not see results that would be seen in the articles mentioned in this report because they were for subacute and chronic stroke patients. The patient showed some increased trunk control during her stay at the hospital by going from requiring minimal assistance sitting at the edge of the bed to SBA by her discharge. This patient had completed some trunk exercises during her stay and her resulting increase in static and sitting balance supports the idea that trunk exercises can have a positive effect on balance as the study in the introduction suggests. The studies mentioned in the introduction demonstrate the possible progressions this patient could see in functional improvement with future therapy. A good evaluation for the patient would be a balance test such as the Berg Balance Scale previously mentioned in the introduction

or manual muscle testing (MMT) to test the uninvolved extremity. The study showed that the BBS has strong reliability, validity and was a valid predictor of length of stay.[10]

Tung et al[13] completed a study on the effects of adding sit to stand training to general physical therapy provided for stroke patients. The experimental group received an additional 15 minutes of sit to stand training along with the 30 minutes of general physical therapy training that both the experimental and control group had (3 times a week for 4 weeks). The general physical therapy training included balance, gait, and ADL training along with lower extremity strength training. This study showed an improvement of lower extremity extensor strength and dynamic balance in the experimental group. This is a good example of an intervention that could be used with this patient when she gains strength to perform a sit-to-stand independently or with future stroke patients.

Howlett et al[14] used 18 trials to complete a systematic review on the effect of functional electrical stimulation (FES) on activity for stroke patients. Upper limb activity was assessed using the Motor Assessment Scale, Arm Motor Ability Test, Nine-Hole Peg Test, Action Research Arm Test, Box and Block Test, Upper extremity Function Test and Wolf Motor Function Test. Lower limb activity was assessed by using walking speed. This review showed that FES had a small to moderate positive effect on activity when compared to the control group (no treatment or placebo treatment). It also showed a moderate effect size when compared to training alone (participants completed same exercises as experimental group but without FES). FES had a large effect on the upper limb activity and a small effect on walking speed when compared with the control groups.

Langhorne et al[15] completed a systematic review on different interventions for stroke patients. They found 19 interventions that were relevant to a stroke. They focused on 4 main areas of outcomes (upper limb, hand function, standing balance, and gait). Constraint-induced movement therapy, mental practice of motor imagery, EMG biofeedback, and robotics were found to be the most promising interventions for the upper limb. No significant results were found in their research for hand function. Biofeedback and balance training on a moving platform were promising interventions for standing balance, but inconclusive. Cardiorespiratory training and a mixture of cardiorespiratory and strength training seemed promising interventions for gait training. This can be useful information for future stroke patients.

Liao et al[16] completed a systematic review on the effects of whole body vibration therapy on stroke patients. They ended up using 10 articles for their systematic review. No consistent benefits of whole body vibration on bone turnover, leg motor function, balance, mobility, sensation, fall rate, ADLs, and participation were found. Limitation of this study was that there were few studies on the effect of whole body vibration on stroke patients thus there is insufficient evidence to support or negate this intervention.

The implications of this case report suggest that it can be a long road to recovery for stroke patients and that patience is needed when it comes to therapy. One limitation of this report includes that the patient was only seen by us in the hospital for 16 days before being transferred to a nursing home to receive long term care. Recommendations for future studies include having a large number of patients a duration of longer than 2.5 weeks. Another recommendation is including males and females in the study and a variety of ages to see if there are any changes in recovery time when it comes to the age

of the patients. Other limitations of this report were that no balance tests or MMT were completed that would allow comparison of this patient with other studies.

Reflective Practice

Since the patient's stroke was so recent we were unable to complete any functional tests. Her left upper and lower extremities were both flaccid and she was unable to stand without assistance, thus not allowing us to assess any standing balance activities or her strength on her left side. The BBS would be a good balance and functional test to perform with the patient once her left extremities were no longer flaccid. A good balance assessment that could be used for chronic stroke patients is the Mini Balance Evaluation Systems Test (Mini-BESTest).[17] It has an excellent test-retest reliability (ICC = .96), excellent interrater and intrarater reliability (ICC = .96), and excellent correlation with the BBS (r = .83). Limitations of our treatment plan was that we did not know how long the patient would be staying in the hospital before she was approved to go to a nursing home and the fact that we only saw the patient for 18 therapy sessions also limited our plan of care and being able to see the patient's progression through therapy.

A quality of life scale (QOL) was not given to the patient during her stay in the hospital. One option that could be used in the future is the Stroke Specific Quality of Life Scale (SS-QOL). It is made up of 49 questions that cover 12 domains including mobility, energy, mood, self-care, etc.[18] The test takes 10 to 15 minutes to administer and the scores ranges from 49 to 245 (higher scores correlate better functioning). It has excellent internal consistency with Cronbach's alpha (>.73) for each domain and excellent

construct validity ($r^2 = .65$) when the overall SS-QOL score is compared to the overall score of the Short Form 36 Health Survey (SF-36).

Future research could focus on acute stroke patients in order to get a better idea of the best initial treatments for stroke patients. It would also be beneficial if studies would follow patients from the initial time they had the stroke to 3 months, 6 months, 12 months, 18 months, etc. in order to see patient progressions and the changes in the treatment plans for the patients. One limitation of our case report is that we do not have tests or measures to compare with other studies.

The patient was in the hospital for 16 days and had a total of 18 physical therapy sessions. I used the online Medicare calculator to calculate the total cost of her physical therapy to be about $1,240.90 ($68.94 per therapy visit).[19] The estimated out of pocket expense for her physical therapy was $310.23. I looked into the average cost of staying in a nursing home per day in the area and it was $186.[20] She could have major long-term costs on her path to recovery, but the benefits will outweigh the cost if she is eventually able to return to her assisted living apartment. Even though we only saw the patient for 18 therapy sessions we were able to see some improvement in her sitting balance (static and dynamic), static standing with 2-person maximal assistance, and bed mobility. Even though the patient was unable to walk during her hospital stay we were able to provide her with some mobility by teaching her how to use a hemi-height wheelchair and the right hemi-propulsion technique. By her discharge she was able to propel herself at least 100 feet. Future research should focus on finding the best initial treatments for acute stroke patients in order for physical therapists to provide the most efficient therapy for these patients.

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