

Physical Therapy Management of an Adolescent with Conversion Disorder:
A Case Report

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Abstract

Introduction: Conversion disorder has been defined as a coping mechanism against psychological trauma or emotional stressors. It is manifested in physical disability often affecting voluntary motor and sensory systems. **Case description:** This case is that of a 13 year old female who was referred by her neurologist to an out patient physical office with an acute onset of sensory changes, gait abnormalities and an inability to independently ambulate as well as perform activities of daily living and self care. The physical therapy treatment approach was centered around behavioral modification including positive reinforcement techniques in the form of feedback and praise for display of desired responses, while ignoring unwanted responses were among the techniques used. **Outcomes:** The patient demonstrated prompt resolution of most movement disorders and returned to independent functional mobility, self care, activities of daily living and school. **Discussion:** It is believed that, in this case, the patient experienced these physical impairments as part of symptom expression associated with conversion disorder, due to traumatic events. **Conclusion:** Conversion disorder is a difficult disorder to diagnose and early recognition of the disorder is cornerstone of a positive prognosis and recovery. The proposed treatment approach utilizing positive reinforcement and functional activities coupled with psychotherapy to facilitate recovery was effective in this instance.

Introduction

Differential diagnosis is an important aspect of the physical therapy evaluation. When investigating and treating a patient with dysfunction of unknown etiology, the ability of the clinician to differentially diagnose and recognize flags can ultimately affect the rehabilitation approach used and treatment outcomes. A medical assessment can be used to rule in/out the need for referral and to determine appropriateness for treatment. Specifically, in the case of a patient whose signs and symptoms do not match physical findings it is important to be able to recognize the need for referral and interdisciplinary communication. Often, psychological factors that can have an effect on a person's physical ability may be overlooked upon initial evaluation.

Conversion disorder is a psychological disturbance either brought on by trauma or other stressors that is manifested by physical disability without organic cause. Presenting symptoms of conversion disorder are typically those involving voluntary motor and sensory changes or deficits^{1,2}. These medically unexplained neurological symptoms tend to include convulsion, dyskinesia, weakness, paralysis, paresthesia, blindness or speech disorders.^{1,3} The symptoms are often inconsistent with physical findings and functional testing. However, it should be noted that the deficits displayed are not under volitional control. Furthermore, disability from this disorder is similar to disability arising from pathological conditions as it has an effect on functional, social, and occupational activities of the patient as well. If symptoms are left untreated it can lead to lasting deficits such as muscle weakness and contractures due to disuse and postural compensations.^{1,2,3}

Previously it was believed that the cluster of unexplained symptoms represented missed organic conditions that may later be discovered in follow-up examinations. It has recently been established through the use of meta-analysis that the rate of missed diagnosis with conversion

disorder is around 4%, indicating the decreased likelihood of missed diagnosis.¹ Diagnosis of conversion disorder generally involves a multidisciplinary team-centered approach involving, among other clinicians, a neurologist and psychologist.^{1,3} As symptoms progress or change drastically with treatment, the diagnosis of conversion disorder is typically then realized^{1,3}. Physical therapists are in a unique position to be critically involved in the diagnosis and treatment of people with conversion disorder. As Vision 20/20 continues to be realized, Physical therapists have the potential to be the first clinicians to see a person presenting with these symptoms and functional losses⁴

Osgood-Schlatter disease is osteochondrosis that is the result of fibers of the patellar tendon pulling on fragments of immature bone of the tibial tuberosity. The most likely cause is indirect trauma of repetitive stress created by powerful quadriceps contractions. Recent literature suggests that this process is part of a sequelae of biomechanical dysfunctions related to the extensor mechanism. This disease is more common in developing males ages 10-15 years than females ages 8-13 years with a ratio of 3:1.^{4,5} The clinical manifestation of Osgood-Schlatter disease is that of constant pain and point tenderness in the area of the tibial tubercle. The tibial tubercle is often enlarged on visual examination as well. Along with these signs and symptoms, there may also be swelling and heat in the general area. The symptoms are often aggravated with activities such as running, jumping or an activity that may elicit a forceful contraction of the quadriceps muscle such as climbing stairs. Clinical diagnosis is often confirmed with radiographic imaging.^{4,6} Conservative treatment approaches such as rest from the aggravating factors and relief of swelling are often enough to suffice until symptoms subside. This time frame can range from 2 week to 2 months in severe cases. Non-steroidal anti-inflammatory

medications and ice are used regularly to treat until an exercise regime to address mechanical dysfunction can begin.^{4,5}

Scheuermann's disease is a structural deformity that occurs in adolescents. It is an anterior wedging of 5 degrees or more in 3 or more adjacent thoracic vertebrae. This disease generally affects adolescents between the ages of 12-16.⁴ It has been associated with increased levels of growth hormone and during periods of rapid growth. Adolescents with this disease are usually asymptomatic however, some may experience discomfort along the apex of the curve. Diagnosis is made through postural screening and radiographic imaging.⁴ Treatment consists of postural training and exercises and in severe cases, bracing has been found to be effective.⁴

The physical therapy treatment approach for conversion disorder should address the physical and functional deficits as if they were organic in nature while maintaining a close level of communication with the other health disciplines involved in the case.^{2,3} A positive reinforcement approach has been used in some cases involving physical rehabilitation of persons with conversion disorder with good outcomes. The positive reinforcement approach is largely based on promoting the expressed characteristics of proper functional mobility when witnessed in therapy either during treatment or on initial observation at the onset of each session, while ignoring or giving no reinforcement to movement behaviors that are less functional or unwanted.^{1,2,3} It has further been suggested that patients, if admitted to a rehabilitation program, should be placed in units corresponding to their disability. For example, patients expressing paraplegia or tetraplegia should be placed in a spinal cord injury unit or those with hemiparesis or hemiplegia placed in a stroke unit.³

This case study presents the physical therapy management of a 13 year old girl presenting with neuromuscular deficits of unknown etiology, the physical therapy approach to differential

diagnosis, interdisciplinary communication and course of action leading to a diagnosis of conversion disorder and the physical therapy interventions and treatment strategies used. This case report has been approved by the Institutional Review Board at The Sage Colleges in Troy, NY.

Case Description

The patient was a 13 year old female presenting to physical therapy for initial evaluation with possible diagnoses of Scheuermann's disease and Osgood Schlatter's disease. Through the interview process and review of the patient's medical records the history of the patient's present disorder was documented.

Examination

History: The patient began to experience bilateral knee pain that progressed gradually over several months. Her mother states that the first time the patient mentioned that her knees were bothering her was when the patient and her family were visiting her sister-in-law. At this time, the patient's mother revealed that the patient had an older brother who was prone to emotional disturbances. He passed away within the last few years due to a motor vehicle accident and is survived by his wife and daughter. The interview process continued with asking if the patient could think of any time where she may have experienced direct injury to her knees. The patient reported that months after her knee discomfort started she experienced a fall on the stairs of her home due to buckling of her knees and has reported having persistent pain since this time. Her mother noted that the patient's father had experienced a fall on these stairs a couple of months earlier. At this time the patient's mother expressed that they have been trying to figure out what is going on with the patient for several months and have seen multiple medical

specialists to no avail. Her mother then provided all of the medical records she had obtained from the patient's medical visits over the past several months.

Immediately after the patient fell she was taken to the emergency room and evaluated for possible fracture of her right lower extremity. Through the use of x-ray imaging, no abnormalities were noted in her lower extremities. The patient was discharged with crutches, ace wrap to her right lower extremity and referred to her primary care physician for follow-up. She was seen by her physician who diagnosed her with muscle strain. The patient's mother then stated that the patient began to experience some back pain and headaches intermittently recurring over the following month with persistent pain still in her lower extremities. She was again seen by her primary care physician and was tested for Lyme and rheumatoid factor, the results of which were negative. She returned to the emergency with worsening pain in bilateral knees approximately one month later. The emergency room physician suspected a diagnosis of mild Osgood Schlatter's disease, prescribed Ibuprofen and Tramadol, a synthetic analgesic, for pain and referred her to an orthopedist. She was seen by an orthopedist where plain films were taken and it was determined that there were no physical bone abnormalities or presence of Osgood Schlatter's disease. The orthopedist suspected patello-femoral syndrome and recommended physical therapy.

One month later she was again taken to the same emergency room for a similar complaint of bilateral lower extremity pain and referred for an MRI for suspect bursitis. The MRIs of her lower extremity were normal. Review of the patient's medical records revealed that a few days earlier to this event, the patient had been taken to a different emergency room with complaints of headache, weakness and lethargy. Here, CTs of her head, neck and chest were performed and were all normal aside from noting a mild reversal of her cervical curvature with no apparent

swelling of surrounding tissue, changes in disc space or narrowing of the neural foramina.

Following this, the patient was referred to a neurologist for consult.

The Neurologist ordered non-contrast MRIs of her thoracic spine due to muscle weakness of her lower extremities. These MRIs revealed normal appearance of her cervical and thoracic region through T5/6 levels. The results of MRIs from T7-11 indicated increased kyphosis and anterior wedging of the thoracic spine with mild disc bulge at T7/8 suspect of Scheuermann's disease. All MRIs of her lumbar spine were unremarkable. Nerve conduction velocity and EMG readings were taken and indicated no evidence of neuropathy, myopathy, or radiculopathy in the lower extremity. There was no confirmation of the diagnosis of Scheuermann's disease found through medical record review or consult with her physician.

The patient was later seen on several occasions by a rheumatologist where clinical findings were unremarkable for Juvenile Rheumatoid Arthritis and other joint disorders. Concurrently the patient had been seeing her primary care physician who had been following her case and later recommended that she receive a psychological consult and evaluation for possible psychosomatic illness.

Her mother reports that the patient was previously independent in all activities of daily living and attending public school until the progression of her condition lead to an inability to ambulate independently. Her family then arranged for her to be tutored at home as the school reportedly refused to provide services for her due to a lack of medical documentation regarding the necessity for services. She is currently unable to ambulate without assistance and using a wheelchair for mobility out in the community. She had been relying on her mother for assistance with all transfers, bed mobility, dressing, toileting and bathing as well.

Systems review: The patient entered the facility via a wheelchair and was escorted back to examination room. The patient appeared shy and quiet, with slouched posture in the wheelchair. She spoke softly and with minimal eye contact when responding to questions directly posed to her. Her mother stated that the patient is embarrassed because she has been having some digestive issues and frequently stutters, burps, or passes gas when speaking. The patient reported bilateral knee pain in the anterior aspect of the patellar region 7/10 at rest and with activity. The patient reported the quality of her pain to be difficult to describe but more closely associated with a dull ache. Exacerbating factors include walking, standing for 5 minutes or more and palpation. Palpation revealed 2+ sensitivity to touch in this region. Relieving factors include heat or ice to the affected area.

Tests and measures: (Initial exam only) Sensory testing for light touch applied to bilateral lower extremities was intact. The patient exhibited withdrawal reflex due to pain with light touch to bilateral knees, along proximal 1/3 of the tibia, quadriceps, hamstrings, and calf region. Reflex testing of the lower extremities was not performed secondary to pain reports. Negative coordination testing using finger to nose and finger to therapist's finger was intact. Heel to shin testing was limited by pain. Testing applied to bilateral knees using anterior drawer test, posterior drawer test, varus and valgus stress tests were negative throughout. Testing for chondromalacia of the patella utilizing the patellar grind test was positive for pain. Hamstrings straight leg raise testing results include left lower extremity active range of motion 20 degrees passive range of motion 52 degrees, right lower extremity active range of motion 10 degrees passive range of motion 34 degrees.

Bilateral girth measurements were taken by the therapist using circumferential measurements at the knee joint line, 2 inches above the joint line and 2 inches below the joint

bilaterally. These measurements revealed a slight difference in lower extremity girth of the right lower extremity compared to the left averaging indicating possible muscle imbalances.⁸ Lower extremity strength assessments and joint range of motion measurements for the lower extremities were performed and are listed in Table 1. Strength testing revealed bilateral weakness in ankle dorsiflexion, knee flexion and extension, as well as hip abduction, adduction and flexion with pain.⁹ Joint range of motion was limited actively on the left and right lower extremities. However passive motions were all within normal limits with the right lower extremity limited in hip flexion due to pain.¹⁰ No positive endfeels were noted.

A postural screen indicated an increased lumbar lordosis and moderately increased and flexible thoracic kyphosis with forward head positioning. Also in the standing position the patient had level iliac crests. Patellar alignment included an inferior tilt, lateral glide and slight external rotation. In the seated position the patient had elevated left shoulder. In assessment of the patient's movement patterns postural fixation and bracing or splinting is noted however muscle tone appears normal with PROM. For bed mobility, the patient demonstrated transferring from supine to/from sit with supervision. She was able to perform turning, rolling and scooting with supervision. During sit to stand transfers with minimal assistance the patient demonstrated buckling in bilateral knees and was able to maintain balance in standing with crutches with minimal assistance. During ambulation the patient had tendencies to hop or swing forward with both legs at the same time and exhibited extensor thrust of her trunk. She was able to take small steps using a step to pattern with moderate to maximum assistance and cueing for a distance of 30 feet. Her gait pattern resembled ataxic or choreatic movement patterns.

Evaluation: The patient is 13 year old female with a diagnosis of Osgood Schlatter's disorder of bilateral knees. The patient has severe limitations in functional mobility and would benefit from skilled therapy to maximize functional ability and promote her return to functional independence. However, initial exam findings do not match subjective reports.

The patient's tests and measures were not concurrent with observational findings and subjective reports, and functional mobility deficits appear greater than testing indicated. The patient is still undergoing medical testing and evaluation for a definitive diagnosis at the time of initial evaluation. Consultation and follow-up communication with her current healthcare providers will be pursued.

Diagnosis: Preferred Practice Pattern 4D Impaired Joint Mobility, Motor Function, Muscle Performance and Range of Motion Associated With Connective Tissue Dysfunction.¹¹ **Preferred Practice Pattern 5A** Primary Prevention/Risk Reduction for Loss of Balance and Falling.¹¹

Prognosis: Due to the physical findings upon examination, the history of progression of the patient's current functional status and the patient's willingness to participate in therapy, the prognosis for full recovery was fair. It was anticipated that that the patient would regain her ability to independently ambulate, negotiate her environment as well as perform ADLs and self care independently by discharge.

Short Term Goals:

1. The patient will be independent in her home exercise program in two weeks.
2. The patient will transfer sit to stand with Min A in two weeks.
3. The patient will be independent in desensitization application to bilateral knees in two weeks.

4. The patient will be able to tolerate standing with crutches and CGA for 5 minutes in two weeks.

Long Term Goals:

1. The patient will transfer sit <->stand from surfaces of different heights independently by discharge.
2. The patient will demonstrate ambulation independently without a device for distances of 300 feet by discharge.
3. The patient will maintain dynamic standing balance for 30 seconds independently by discharge.
4. The patient will report a decrease in pain to 2-3/10 with activity by discharge.
5. The patient will climbing ↑1 set of 12- 15 steps of standard height independently with no use of hand rails and step over step pattern by discharge.
6. The patient will be independent in all self care and activities of daily living by discharge.

Plan of care: The patient was seen 3 times a week for 1 hour sessions initially with re-evaluation in 30 days. Treatment included therapeutic exercise, strength training, manual therapy, modalities, mobility and gait training.

Interventions: Treatment of this patient took place in the out-patient physical therapy clinic that is affiliated with the local hospital. Following the initial evaluation and at the onset of the initial treatment the complete past medical history of this patient had not yet been disclosed. The nature and etiology of the patient's disability was at this point still unclear to the treating therapist. However, the involved therapist was concerned that this was not a clear case of

Scheurmann's disease or Osgood Schlatter's disease and expressed intent to further discuss their concerns with the patient's mother and other health care providers as the patient's signs and symptoms did not match physical findings. However, the therapist proceeded with the intention to treat the patient's signs and symptoms until further communication with the patient's physician and mother could take place. It was not until treatment session 8 that the treating physical therapist was able to receive confirmation from the patient's psychologist that the physical symptoms the patient was expressing were most likely a result of psychological overlay due to conversion disorder. The literature states that the treatment of conversion disorder by a physical therapist should be addressed with the patient. In a non confrontational manner the therapist should state to the patient that the diagnostic findings of the examination were negative and a full recovery is expected. Due to the delicate nature of treating an adolescent with conversion disorder, the patient's mother was directly informed of these findings and the patient informed that while there were no conclusive results, it was believed that she could be treated and recover from these dysfunctions.

The initial treatment approach was focused on the patient's movement dysfunctions including addressing muscle weakness of her lower extremities, balance and coordination. The patient's sensitivity to touch was addressed as well but only minimally as it was noted upon initial evaluation that the patient only expressed a withdrawal when palpation was introduced by therapist stating "let me know if this hurts". It was decided that this time that while it was important to address pain management; the focus of the patient's treatment should not be on pain as this may prove to positively reinforce the pain pattern.

The following interventions were carried out in the first month of treatment sessions and were geared toward addressing the patient's obvious muscle weakness via strength training,

muscle reeducation, postural stability, and balance disabilities. The second month of treatment was again geared toward addressing the patient's movement dysfunctions however; less emphasis was placed upon addressing disability and more on emphasis on functional ability. There was no mention of how she may not be able to perform well when new interventions were introduced. Instead the patient received positive encouragement from the therapist such as statements like "this should be easy for you since you have already been able to ..." and when the patient performed a task well she was praised and then challenged with either an increase in workload or an intervention that was similar to but slightly more difficult than previous interventions. No indication of how difficult the activity may be for the patient was made.

The first two months of treatment are detailed in the following section. Following this the patient's treatment continued in the same manner working toward progressing functional mobility and integrating activities of daily living. It was of concern to the treating clinicians and the patient's family that the patient may experience a return of symptoms once faced with her return to school. The activities of daily living were therefore geared toward integrating functional tasks that the patient would encounter in the school environment. Her response was closely monitored and discussed with her psychologist.

Treatment session 1: At the onset of treatment the patient reported that there was no change in her level of discomfort or any changes in her current functional status. She stated that her legs hurt and rated her pain as a 7/10 on the Numeric Rating Scale for pain.¹² An 8 minute warm-up on the NuStep exercise equipment utilizing lower extremities only at an intensity setting of 1 per the manufacturer's level of intensity increment rating system. With verbal cueing the patient and the visual of the "steps/minute" digital display on the machine the patient was

able to increase her speed of movement from less than 10 steps per minute with visible trembling of both legs to 60 steps per minute without evidence of trembling. The therapist provided positive feedback and reinforcement to the patient by stating “I think you are much stronger than this, why don’t you try to show me how fast you can go without increasing your level pain”. The patient was also able to receive immediate feedback by watching the monitor. Once she reached a pace of 60 steps per minute she was asked to keep watching the digital monitor and try not let that number change. These verbal cues were done in a cheerful manner. Once the patient had maintained her cadence consistently for a couple of minutes, verbal reinforcement was withdrawn and the visual feedback of the digital monitor was maintained. The patient reported that her knee pain remained throughout the warm-up session on this equipment but did not progress or change. Short-arc Quad (SAQ) sets were performed on a mat table 3 sets of 10 repetitions bilaterally with ease and no significant verbal cueing. In the supine position, modified double knee to chest (DKTC) exercises were then performed on the mat table with patient resting the distal ½ of her lower legs on a suitable sized Thera-ball. The patient was instructed to bring her knees toward her chest by rolling the ball under her legs toward her head. The patient received verbal cues for trunk control and posture only and performed 20 repetitions of this exercise with minimal difficulty.

Sit to stand transfer training was then executed from a hi-lo mat set at 23 inches, 10 repetitions in the hammer-position with moderate assistance (ModA) of one therapist who emphasized forward weight shifting and eccentric control to the patient. Postural adjustments were demonstrated and manual facilitation was applied when needed. Pre-gait training in parallel bars was performed with the patient using bilateral upper extremity support and ModA of one therapist with the use of a gait belt as well as an assistant who provided a wheelchair

follow along. The patient presented with extensor thrust type movements of her trunk when stepping and a posterior lean with hand placement set slightly posterior to the midline of her trunk, shuffling and ataxic gait and alternatively a hop to or step to pattern along with a consistent right foot eversion and toe drag. The therapist provided verbal cues for foot placement with emphasis on step length and knee extension, maintenance of hand placement slightly anterior to the trunk and trunk alignment. Four trails of 10 foot increments were carried out. The patient was given several rest breaks throughout the course of treatment. At each break she was seated and given water. The patient's mother and younger sister were present throughout the first treatment session. The patient was not sent home with a home exercise prescription at this time as she was scheduled to be seen for an hour every other day; however her first two treatment sessions were scheduled for consecutive days due to scheduling conflicts. It was further believed that this would be a sufficient amount of therapy to start in the interest of promoting patient attendance and participation in therapy.

At the conclusion of this treatment session, due to the patient's responses to treatment, the treating therapists involved began to suspect a diagnosis with psychological components over those with organic cause.

Treatment session 2: At the onset of treatment the patient reported that her legs were a little sore the night following her initial treatment session. She applied ice to her knees and reported that her legs feel as they did prior to her initial treatment session the day before and rated her pain as 7/10. The NuStep was again utilized at the onset of treatment in the same manner as previously described however the level of intensity was set at 3 for a duration of 6 minutes. Less trembling of her legs during this exercise was noted. SAQ sets were performed as before with no change. Straight leg raises and bridging exercises were then instructed on the mat

table. The patient completed 2 sets of 10 repetitions each with no assistance or verbal cues other than for initial instruction. She was then instructed in supine isometric hip adduction exercises with the use of a ball between the knees, supine hip flexion exercises bilaterally, prone knee flexion and hip extension exercises of 20 repetitions each exercise. Hip abduction exercises were conducted in sidelying 10 repetitions each leg. Sit to stand transfers were performed as before with minimal assistance (MinA) this time however and verbal cues. Pre-gait training in parallel bars was performed as previous. Ambulation with bilateral axillary crutches, a left knee immobilizer for knee extension and moderate assistance through gait belt was attempted. The patient required frequent verbal cues for crutch position and to avoid hopping by use of reciprocal gait pattern. Ambulation with a rolling walker was then trialed. However, the patient expressed increasing shoulder and hand pain.

Treatment session 3: The patient reported having been swimming in her pool at home for the first time and that she was attempting to be more independent at home as well. The patient further reported that due to this she may be a bit more sore today than usual and rated her level of pain as 8/10. However, her disposition was cheerful and pleasant. Treatment began with a 10 minute warm-up on the NuStep at an intensity of 4 with no trembling and consistent cadence. Following this, the patient was instructed in Thera-ball floor exercises over a padded exercise mat. The patient transferred from wheelchair to floor with MinA through a gait belt. She performed prone of peanut shaped Thera-ball alternating arm raises, alternating leg raises, arm with contralateral leg raises, arm with ipsilateral leg raises and prone over ball arm walk out. She executed 10 repetitions of each exercise bilaterally with contact guard and verbal cues for technique only. Floor to wheelchair transfer training was performed with ModA. Pre-stair training in parallel bars was carried out with alternating foot taps utilizing a 1 inch step and

MinA through the use of a gait belt. Ambulation in parallel bars was performed as before with improvement in severity of trembling, postural and gait abnormalities notable. Therefore, ambulation with bilateral axillary crutches was again attempted. The patient showed more control and decreased severity of gait abnormalities. She received ModA through the use of a gait belt as well. It should be noted that at the beginning of this treatment session a student physical therapist familiar with the case was to assist in initiation of the treatment session while the treating physical therapist met with the patient's mother to discuss concerns of the patient's diagnosis. At this time the patient's mother revealed that the patient would be undergoing psychiatric evaluation and is awaiting an appointment with a rheumatologist as well. The patient's mother stated that she is unsure if what her daughter is going through is psychological in nature. However, her pediatrician has expressed concern and since none of the other specialists the patient had seen had been able to provide a conclusive diagnosis she was willing to have her daughter see a mental health specialist. Her mother also revealed that the patient's older brother had recently passed away and that he had a previous history of emotional episodes. Along with this her mother expressed her initial belief when the symptoms first presented that the discomfort that patient was experiencing was related to the onset of menses. The therapist requested that the patient's mother keep her apprised of progress with the psychological evaluation and offered to speak with the psychologist of necessary.

Treatment session 4: The patient's mother reported that transfers at home are now much easier and the patient is attempting furniture walking at home. The patient reported her pain as 7/10 at the start of therapy. The interventions of this treatment session were as previous for all activities aside from ambulation. It was noted that the handle height of the crutches should be adjusted while the patient initially attempted to ambulate. Following this adjustment the patient

ambulated 100 feet with contact guard (CG) and continued to show improvements in all areas of movement during ambulation.

The patient reported a pain rating of 7/10 at the beginning of therapy. The patient had since been seen by a Rheumatologist that morning and reported that blood work was positive for AS gene. At the beginning of therapy the patient demonstrated that she was now able to perform a sit to stand transfer with CG. The patient was warmed-up on the NuStep at level 5 for 5 minutes and in the interest of keeping the patient engaged in therapy the therapist asked the patient if there was any other equipment she would like to try as she seemed interested in the other gym equipment during her last treatment session. The patient requested to try the Kinetron stair climber. This was done for 10 minutes at a workload of 30cm/sec with no difficulty. The patient seemed to enjoy it. Following this the patient carried out thera-ball exercises consisting of lower trunk rotation with bilateral legs supported over the ball and single knee to chest with leg supported over ball bilaterally. The patient accomplished 2 sets of 20 repetitions each. Following these interventions ambulation in the parallel bars was performed with contact guard and verbal cues for sequencing as well as hand positioning on the rails. The patient repeated 3 series of 40 foot bouts. The patient received positive reinforcement for this accomplishment. Further ambulation training in the parallel bars included stepping over low barriers of 1 inch in height. She used a step to pattern initially and was asked to try a step-over-step pattern which she was able to do with contact guard of 2 people on either side. She was able to accomplish 2 sets of 40 foot distance before requiring a break.

Treatment session 5: The patient arrived to therapy ambulating with a standard walker with supervision. She reported that she was feeling more balanced and decided to try using one of her relative's walkers over the weekend. She continues to report her level of pain as a 7/10.

Therapy consisted of the NuStep, recumbent bicycle, quadruped arm and leg raises, thera-ball exercises of double knee to chest, single knee to chest, lower trunk rotation, bridging in and supine with her feet over the ball. She continued with balance exercises such as standing in place and then marching on an Airex mat in the parallel bars, tilt board exercises in standing in all four planes and side stepping. Ambulation training was conducted in parallel bars with single hand support progressing to no use of hands and contact guard assistance. Verbal cues for step length, knee extension during weight acceptance and for right foot external rotation were provided. She was able to ambulate six repetitions of 40 feet and was given much praise for such a vast improvement. The patient then ambulated 250 feet with supervision and the use of her standard walker in moderately busy facility halls.

Treatment session 6: The patient ambulated in to the clinic using a Rollator and with supervision. She reported that her knees were feeling “ok” and stated the pain persisted at a 7/10. Interventions included a warm-up on the NuStep machine, the use of the Total Gym for pull-ups, squats, bilateral heel raises and rows performed for general strength training. The patient then successfully ambulated using NDT poles to emphasize posture and trunk extension with contact guard through a gait belt for 2 trials 150 feet. The Berg Balance Test was performed following interventions. The patient score was a 42/56 indicating a 100% risk of falls.^{13,14}

Treatment session 7: The patient had began ambulating independently with the Rollator. She had missed her last scheduled session as she had been sick with a sinus infection. She reported that she has been less active since being sick. Her level of pain remained unchanged at a 7/10. However, she reported that her that her knees had been bothering her more. Interventions using the NuStep and Total Gym equipment were performed as in the previous session. Side-stepping with bilateral NDT poles and the use of orange Thera-Band at her ankle then thighs was

applied for greater strengthening during this activity. Ambulation with bilateral poles was again carried out as in the previous session however with orange Thera-Band applied around her mid thighs to facilitate a greater step length and forward right foot positioning. The Thera-Band was loosely tied and the patient was instructed to not allow it fall to her ankles while ambulating. The patient then ambulated in the parallel bars with facilitation at the pelvis and shoulder for resisted forward walking and to facilitate co-contraction at the trunk. She then did 2 sets of 10 feet distances of heeling walking. Following this, stair training was performed. She ambulated up and down one flight of standard height stairs with the use of one rail and a step-to pattern ascending and step-over-step pattern descending with contact guard to start and then supervision. At the end of interventions Hypafix and Leukotape were applied to the distal patellar tendon at just superior to its attachment to the tibial tuberosity with medial and lateral superior pull in with the hope of providing some support to alleviate the patient's complaint of pain. She was instructed to leave the tape on until her next appointment or for as long as possible until then. At this point the patient had made marked improvements in functional mobility and was ambulating with markedly decreased abnormal movement patterns. Her movement during ambulation could now be attributed to postural control with the exception of the persistent right foot eversion with circumduction and occasional toe drag during swing phase of gait.

Treatment session 8: The patient reported feeling well this session and that her knees felt about the same as always. She rated her pain coming in to the clinic as a 6/10. She further reported that she believed the tape made no change in her level of discomfort so she removed it. Focus of her interventions continued to be on ambulation, progressive balance exercises and postural adjustments during gait. This session she was introduced to the Elliptical trainer for endurance. Further investigation of her right foot revealed marked decrease in strength of her

right foot compared to her left. Manual muscle testing revealed right ankle dorsiflexion strength as 4-/5 compared to 5/5 on the left. Ambulation with foot wrap for dorsiflexion assist was applied to the right foot. This appeared to increase the amount of eversion and circumduction during ambulation.

Treatment session 9: This session consisted of a one month re-evaluation and examination of the patient to be discussed in the outcomes section. At the onset of this visit the patient stated that she had been in her pool over the weekend and was experiencing increased body pain and a pain rating of 6/10. The patient's mother revealed that this weekend was also the birthday of the patient's deceased older brother. Manual desensitization techniques were applied to the patient following re-evaluation in order to address her level of pain. The patient was also then instructed in home techniques using a towel and applying the technique to her anterior knees. She was given examples of ways to fit this technique into her daily life such as performing it in the car while traveling to doctor appointments or while watching TV at home.

Treatment session 10: The patient reported that she had increased hip pain over the last couple of days rating all pain as a 6/10. However she was showing significant improvements in endurance for ambulation. The treatment session began with a warm-up routine on the NuStep for 5 minutes at level 7. Following this the patient ambulated in the hallways of the hospital as a trial for school ambulation; a distance of greater than 500 feet with her Rollator and supervision. A posterior leaf spring (PLS) brace was then applied to the patient's right foot prior to a second bout of ambulation in an attempt to address the patient's persistent foot eversion. The patient showed improvement in hip alignment and foot placement during ambulation. She was able to ambulate 500 feet without an assistive device and close supervision. Following ambulation training, the patient participated in resisted walking forward, backward and sideways in all

directions with the use of cable column equipment. 20 pounds of resistance was applied initially and then increased to 30 pounds as the patient reported that 20 pounds was too easy.

Treatment session 11: The patient reports that she is feeling much better today and her level of pain is a 6/10. Treatment began with ambulation training utilizing Neural Developmental Training (NDT) poles to facilitate arm swing, posterior leaf spring brace and close supervision for a distance of 500 feet. She demonstrated slight improvement with foot placement and hip alignment while ambulating with and without the brace. She then ambulated in the facility hallways a total distance of 500 feet with supervision. She was instructed in alternating forward walking, backward walking, side stepping and grape-vine technique for approximately 50 feet in each direction. The patient continued to evert her right foot and externally rotate her hip while ambulating however this did not increase with fatigue. She received less verbal cueing for foot placement as well. Following ambulation she participated in resisted walking via the cable column equipment as before. Finally and with the intention of keeping the patient engaged in therapy, the patient was instructed in the use of the Pro-fitter resisted glide board with use of bilateral upper extremity support of railing for 5 minutes then (NDT) poles. The Pro-Fitter equipment was used in a fashion that mimics hip motions and weight shifting while down-hill skiing. This was done to facilitate weight shifting for ambulation and hip as well as foot placement.

Treatment session 12: This treatment session was geared toward addressing postural alignment of the trunk during movement. The patient was instructed in “I’s”, “T’s” and “Y’s” for scapular alignment in prone, hip extension in prone and then these postures were integrated into therapy while the patient warm-up on the elliptical trainer exercise machine in forward motion for 5 minutes and then backward motion for 5 minutes. Following this the patient ambulated in

the hallways of the hospital and this time was told to complete a loop that totaled 250 feet as fast as she could while walking safely. The first trial was timed at 4 minutes and 38 seconds, the second trial took 3 minutes and 24 seconds. The patient again ambulated in the hospital hallways, this time carrying books. At this point the therapist had been informed by the patient's psychologist that this simulation of the school environment may produce a setback in the patient's functioning. Therefore this trial was carried out with caution. The patient was given the books to carry and was told that this activity was related to postural stability and no mention of this training being geared toward integration of the school environment was made. However, during this time period the therapist did broche the subject of how the patient was feeling about returning to school but only minimally in that the patient was asked if she was excited about starting the next grade level in school. The patient did respond positively to this conversation and was able to ambulate 500 feet while carrying two phone books of average size and supervision. The patient returned to clinic and was then instructed in returning the phone books to an upper shelf in a cupboard in order to promote overhead reaching in standing and simulate retrieval of books from a locker. The patient was the instructed in stair navigation while carrying books. The patient ascended and descended one standard flight of stairs with books in one hand and holding a railing with the other using a slow but steady step-over-step pattern and close supervision.

Treatment session 13: This session consisted of total gym exercises, thera-ball activities, and cable column resisted walking as previous. New balance activities were introduced consisting of the patient standing on a fitter disc with double leg stance and then single alternating leg stance while tossing a standard ball back and forth with the therapist.

Treatment session 14: The patient arrived at therapy without her Rollator and reported that she had not used it in 2 days. However she demonstrated increased kyphotic posture during gait. She continued to report pain at a 6/10. This session, Pilates techniques For core strengthening and postural alignment were introduced including side planks on elbows, supine planks on hands, prone planks on hands, and pectoral stretching supine over a foam roller. Following this the patient was instructed in the use of the upper body ergometer alternating forward and backward cycling every 2 minutes for a total of 4 minutes. The patient again ambulated in the hallways with emphasis on speed and was timed at 2 minutes and 40 seconds for completion of a 250 foot loop with no device and supervision.

Treatment session 15: The patient again engaged in Pilates exercises for postural stability and control as previously stated and ambulation on stairs. Ambulation training on uneven terrain consisting of grassy surfaces while navigating up and down hills with supervision produced a decrease cadence however the patient remained steady throughout. The patient attempted a slow run for the first time with close supervision this session in the hallways of the hospital as her request. She received verbal cues to decrease right hip external s rotation and for foot placement.

Outcomes

Month 1 Re-evaluation: The patient made steady progress toward establishing her goals and the patient's mother continued to concur with the proposed treatment plan. The patient had met or exceeded goals for independence in bed mobility, supine to/from sit using abdominal muscles, and sit to/from stand with no use of hands. The patient scored a 16/24 total points on the Dynamic Gait Index (DGI) during her re-evaluation.¹⁵ A score of <19/24 is indicative of an

increased risk of falling. While the is typically used in determining the risk of falls in the elderly the therapist believed it was applicable in this situation as well as the DGI has been successfully used to determine the risk of falls in other populations such as those recovering from stroke.¹⁵

Re-evaluation 2: Approximately two months following initial evaluation, the patient achieved her goals and continued to make significant gains in therapy. The Psychiatrist, the patient's mother and the PT agreed that while all of the goals set forth in therapy had been achieved, the patient should continue with therapy on a limited basis until after the school year had started to prevent a recurrence with the onset of the school year. The patient was discharged from restorative therapy with plans for a continued maintenance program to be carried out once a week. At the time of this re-evaluation she was ambulating independently a distance of 500 feet with no use of assistive device on even as well as uneven terrain. The patient had succeeded in meeting the therapeutic goals for dynamic balance and the ability to navigate on flight of stairs with use of on hand rail while carrying books in the other hand. Re-evaluation of risk of falls using the DGI revealed a score of 22/24 with stairs being the area that the patient received a 2 point reduction Need reference for DGI a score of 22/24 on the DGI is the minimal score required for indicating safety in ambulation.

Discussion

Over the course of a three month time period in physical therapy the patient made significant and rapid improvements in her mobility deficits. Within 3 weeks of her initial treatment session the patient was independently ambulating with an assistive device as well as making gains in decreasing dysfunctional movement patterns. She showed significant improvements in gait abnormalities and postural stability and continued to do so throughout the

course of her treatment. Along with this, the patient's initially labile personality began to dissipate and she became more vocal, expressive and engaged in her physical therapy treatment. The patient's mother reported that congruent with the onset of knee pain during their family visit with the patient's sister in-law, the patient experienced the onset of menstruation. Following initial medical work-up, the patient began to seek medical attention approximately every thirty days for complaints of leg pain or headaches and malaise. The patient's mother mentioned briefly that she initially thought her daughter's symptoms were related to menstruation until they became so severe that she would need to be taken to the emergency room. The onset of menses can be a traumatic experience for some young women as their hormones begin to change and new emotions as well as physical changes are taking place. This coupled with the patient experiencing the loss of her sibling, and perhaps revisiting these feelings and memories when visiting her brother's wife and child may have facilitated the progression of this disorder.

Through the course of her treatment, the patient was also receiving psychological treatment 2 times a week. This was perhaps the most critical component of her expeditious recovery and return to functioning. Recent research has found that intensive treatment of a person's physical impairments coupled with psychological therapy has been the most successful approach to addressing impairments associated with conversion disorder.^{2,3,16}

The literature suggests that treatment should be focused on symptoms removal using positive reinforcement techniques.^{1,2,3} Therefore the therapeutic approach should be centered around functional tasks that produce the desired response. In this case the patient was not admitted to an inpatient rehabilitation setting. Rather, she was treated in an outpatient clinic that had a diverse population of people with varying diagnosis. This situation proved to be more acceptable for this particular case as it was determined that maintaining a sense of normalcy and

family support in the patient's life would be more beneficial to her. Therefore, this was not deemed as a limitation to her treatment and physical therapy outcome.

The limitations of this study are that the initial diagnosis was thought to be other than conversion disorder which may have lead to inadvertent perpetuation of symptoms due to a lack of knowledge about the treatment approach for conversion disorder initially. Along with this, no specific regime in treatment approach was utilized. A combination of treatment approaches such as positive reinforcement, feedback, combined behavior modification and physical therapy was used.

The portions of physical therapy treatment where behavior modification was used did not follow a strict regime of ignoring unwanted behaviors as the necessity for application of this technique was not clear to the clinicians initially. However, the literature states that the approach is most effective when unwanted behaviors are ignored and only the wanted behaviors are recognized or rewarded. Current research recommends that a combination of behavior modification comprised of positive reinforcement and feedback along with psychotherapeutic and physical therapy interventions has had the most agreeable outcomes.^{2,3,16} It has been recommended that therapist reinforce only behaviors that are wanted while explicitly ignoring those that are not. This is based on BF Skinner 's proposed learning theory model where the concept that a certain behavior that receives a favorable reaction of some kind will reinforce that behavior and increase the likelihood that the behavior will occur again.¹⁶

In this case certain aspects of the patient's deficits requiring treatment such as her persistent toe drag did receive attention intermittently throughout her treatment. It should be noted that this toe drag was maintained throughout the course of therapy to discharge of the patient. When treating a person who has conversion disorder the physical therapist does run the

risk while evaluating and treating the present impairments of reinforcing the symptoms of the disorder.² With this in mind, further research comprised of intensive physical therapy that takes place under the supervision of psychologist may be warranted. This may help the treating physical therapists to better address or prevent this situation in the future.

It is unclear as to how effective treatment of conversion disorder by physical therapy interventions would be if the patient is informed versus uninformed of their diagnosis of conversion disorder. Most conversations about the psychiatric health of this patient took place between the patient's mother and the therapist and it remained unclear to the therapist as to how informed the patient was of her diagnosis of conversion disorder. In retrospect of treatment of this patient, more close communication and documentation from the patient's psychotherapist could have been maintained as well. While the physical therapist did communicate with the patient's psychotherapist, it was not on a regular basis, nor were the conversations well documented. Therefore, one further recommendation for future research includes a conceptual categorized stage of treatment including indications for addressing the patient's diagnosis of conversion disorder as part of the physical therapy treatment approach. This would entail closer cooperation and observation by psychologist or mental health professional during the initial physical therapy evaluation and at regular intervals throughout treatment is proposed.

Conclusion

DSM-IV states that there is a correlation between stressful events and the onset or progression of physical symptoms with conversion disorder.^{17,18} Furthermore, the literature states that while symptoms expressed with conversion disorder are not intentional, the expression and progression of these symptoms are frequently reinforced by social and family support.^{3,16,17,18}

Conversion disorder is a difficult disorder to diagnose and early recognition of the disorder is cornerstone of a positive prognosis and recovery. A favorable prognosis and full recovery for people with conversion disorder is anticipated when the onset of symptoms are precipitated by an emotionally stressful life event, a healthy pre-morbid condition free of other disease or psychological disorders and an acute onset of symptoms.¹⁶ It is believed that, in this case, the patient experienced these physical impairments as part of symptom expression associated with conversion disorder, due to traumatic events surrounding her family life. The proposed treatment approach utilizing positive reinforcement and functional activities coupled with psychotherapy to facilitate recovery was effective in this instance.

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Table 1. Joint Range of Motion Measurements:(*)Indicates pain, (NT) indicates not tested

Location	Strength						Active Range of Motion						Passive Range of Motion					
	Right			Left			Right			Left			Right			Left		
Hip Joint:	I	Re	D/C	I	Re	D/C	I	Re	D/C	I	Re	D/C	I	Re	D/C	I	Re	D/C
Flexion*	4-	4-	4+	4-	4-	4+	85°	86°	86°	65°	92°	92°	95°	95°	95°	118°	118°	118°
Extension	NT	NT	3+	NT	NT	3+	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Abduction	2+	4-	4-	2+	4	4	30°	30°	30°	25°	25°	25°	35°	35°	35°	36°	36°	36°
Adduction	2+	4+	4+	2+	4-	4-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Knee Joint:																		
Flexion	4	4	4+	4-	5	5	114°	114°	114°	115°	115°	115°	120°	120°	120°	122°	122°	122°
Extension	3+	5	5	3	4+	5	NT	NT	NT	NT	NT	NT	-4°	-4°	-4°	-5°	-5°	-5°
Ankle Joint:																		
Dorsiflexion	4+	4+	5	4+	4+	5	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Plantarflexion	NT	NT	4	NT	NT	4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Inversion	NT	NT	4+	NT	NT	4+	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Eversion	NT	NT	4+	NT	NT	4+	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Table 2. Progression of Functional Activities: Amount of Positive Reinforcement Provided

Treatment	Date	Sit <->Stand	Pre-gait	Ambulation	Stairs training	Ambulating Around Obstacles	Progressive Balance Exercises	Community Ambulation	Jogging
1	19-Jun	Mod A *	Mod A *						
2	22-Jun	Min A **	Mod A *	Mod A & AD*					
3	23-Jun	Min A **	Min A**	Mod A & AD*	Min A**				
4	26-Jun	CG ***	Min A**	CG & AD ***	Min A**	CG x2 & AD ***			
5	29-Jun	CG **		S & AD **		CG x2 & AD ***	CG ***		
6	30-Jun	I***		CG & AD ***			BERG test		
7	2-Jul	I**		I with AD ***			S **	S & AD**	
8	4-Jul	I		I with AD *	CG & AD**	CG & AD **	S **		
9	6-Jul			I with AD *		CG & AD **	S **		
10	13-Jul	Re-evaluation conducted this session							
11	15-Jul			CG***			S *	CG ***	
12	20-Jul			S***			S *	S **	
13	24-Jul						S**		
14	27-Jul			I***	S***				
15	3-Aug			I*				S **	I***

Abbreviations and indications: To indicate the level of assistance the patient required during functional activities, (Mod A) is used to indicate when moderate assistance was provided, (Min A) was used for indicating minimal assistance, (CG) was used to indicate contact guard, (S) was when supervision was provided. The Abbreviation (AD) indicates the use of an assistive device during the activities

The levels of positive reinforcement provided were indicated as follows:

*positive reinforcement given 25% of the time

**positive reinforcement given 50% of the time

***positive reinforcement given 75% of the time