

**PHYSICAL THERAPY INTERVENTIONS AND TREATMENT FOR AN 11 YEAR OLD
IDIOPATHIC TOE WALKER: A CASE REPORT**

By

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ABSTRACT

Background and Purpose:

Idiopathic toe walking is a condition where a person walks on the balls of their feet without any known cause or underlying condition. It is common when children are first learning to ambulate but will typically resolve spontaneously. There is limited evidence for appropriate interventions and a plan of care for an idiopathic toe walker. The purpose of this case study was to show treatment and interventions for an older adolescent idiopathic toe walker.

Case Description:

The patient is an 11-year-old female with a diagnosis of idiopathic toe walking. The patient has been toe walking since she learned how to ambulate. The chief complaint is pain in the left thigh and low back.

Outcomes:

The patient had improvements with range of motion, improved mobility, increased hip/core strength and stability, and decrease of pain with functional activities. There was a decrease in pain, from a 7/10 on the initial evaluation to a 1/10. The LEFS improved from a 63/80 to a 69/80. The most notable improvements in ROM were with dorsiflexion, the left foot improved 14 degrees and the right foot improved 12 degrees. The Foot Posture Index remained about the same from initial evaluation.

Discussion:

Idiopathic toe walking has been shown to resolve with time, conservative treatment, and surgical intervention. The main challenge with this patient is that she had a flexible gait pattern. The future goal of the patient should be to form a habit to walk with a normal gait pattern instead of on her toes. There is a lack of research involving specific interventions and treatment for idiopathic toe walkers. There is much opportunity to learn in this area about what interventions this patient population would benefit from.

Key Words: idiopathic toe walker, physical therapy, LEFS, Foot Posture Index, ROM

INTRODUCTION

Idiopathic toe walking is a condition where a person walks up on the balls of their feet without any known cause or underlying condition, like cerebral palsy or muscular dystrophy. Toe walking can be fairly common when children are just learning to walk but typically kids will outgrow this habit. It has been reported that eventually idiopathic toe walkers will resolve spontaneously in the majority of children¹. Most of these toe walkers are young in age and it will resolve before the age of 3. There is minimal research about how to treat an idiopathic toe walker conservatively with physical therapy. What has been shown to help via conservative treatment are passive stretches of the plantarflexors and night splinting². Serial casting is also recommended for idiopathic toe walkers with a program after the casting consisting of passive stretching, active exercises of the plantarflexors, and strengthening exercises of the dorsiflexors². If conservative treatment fails, there are also surgical interventions that can be performed. The main surgical intervention that has been shown to be successful is a tendo-Achilles' lengthening². There is limited research about the treatment for older adolescents who are idiopathic toe walkers and have not received any type of treatment before. There is also a lack in what specific intervention are the most effective in helping correct the gait pattern of an idiopathic toe walker.

CASE DESCRIPTION

The patient was an 11-year-old Caucasian female who presented to outpatient physical therapy with a diagnosis of idiopathic toe walking/tight heel cords. Prior medical history includes unspecified lumbar vertebrae fracture 3 years ago while riding inner tube, polycystic kidney disease, and history of migraines. The patient has been toe walking since she learned how to ambulate. She saw a specialist in Lubbock at the age of 2 ½ who stated she would grow out of the habit of walking on her heels. She has been consistently seeing a chiropractor every month for the past 3 years for adjustments. The chiropractor believed she would benefit from seeing other health professionals for the toe walking. The patient has been wearing night splints bilaterally at night since March 2021 which can be tightened as needed to promote dorsiflexion. The chief complaint of the patient has been pain in the left thigh and low back, as well as occasional pain in the left knee and bilateral ankles. All pain is described as achy and has no reports of numbness or tingling.

EXAMINATION

During initial examination, the patient rated her left posterior thigh/low back pain currently at a 7/10 on the numeric pain rating scale. The patient reports the best it gets is 0/10 and the worst is 7/10. The numeric pain rating scale has been shown to be a reliable and valid measure³. She describes the pain as achy. The patient statically stands with bilateral pes planus and flexible bilaterally. The patient filled out a Lower Extremity Functional Scale (LEFS) on which she scored a 63/80 points, having 78.75% maximal function. The LEFS has been shown to be a reliable and valid⁴. On the Foot Posture Index, the patient score 7 points on the left foot and 6 points on the right foot. This put the patient in the pronated category bilaterally. The Foot Posture Index has been shown to be reliable and valid^{5,6}. When performing the 90/90 hamstring test, the patient was able to get to 0 degrees on the right leg and was lacking 13 degrees on the left leg. The patient is able to correct gait pattern to walk with a heel strike instead of on her toes. The patient was not tender to palpation. Table 1 refers to the active ROM measures taken on this patient, which has been shown to be reliable and valid^{7,8}. Table 2 refers to the MMT scores for this patient.

The patient presents to outpatient physical therapy on this date with a diagnosis of toe walking. She has decreased flexibility in calves, as well as decreased hip flexibility. Due to her abnormal gait, she also presents with decreased core/hip stability. She would benefit from skilled PT to address her impairments to participate in recreational activities such as sports at school without restriction/pain and to improve core/hip stability and promote calf/ankle flexibility to normalize gait. The patient prognosis was that they will return to functional and recreational activities in 8 weeks.

INTERVENTION

The interventions used to treat the patient were therapeutic exercise and therapeutic activity/manual therapy. Therapeutic exercise was initiated upon initial eval with a home exercises program consisting of clamshells, bridges, hamstring stretch, standing gastrocnemius and soleus stretches, straight leg raise in both abduction and extension, and dead bug progression exercises. While in the clinic, the therapeutic exercises consisted of clamshells, bridges, dead bug progression, front planks, modified side planks bilaterally, heel walking, wall squats, theraband inversion exercise, theraband dorsiflexion exercise, and bird dog exercise. All therapeutic exercise were to improve hip/core stability, strength, proper body mechanics, and encourage a normal gait pattern to allow the patient to return to functional activities without pain. The patient needed some cueing with some exercises to correct form, such as with the dead bugs, planks, and bird dogs. As time progressed, the patient needed less verbal and tactile cues in order to correct form.

The therapeutic activity/manual therapy consisted of soft tissue massage/instrument assisted soft tissue massage (IASTM) with a passive stretch, AP mobilization to bilateral talocrural joints, and restricted based approach (RBA) for the lumbopelvic. RBA consisted of PA lumbar mobilization, left reverse lumbar roll, bilateral grand roll, and shotgun technique, all of which were initiated on the 5th visit, and left lumbar roll which was initiated on the 10th visit. Left hip IR mobilizations and left hip posterior mobilizations were added during the 6th visit but were discontinued on the 7th visit due to patient report of making her symptoms worse. IASTM with a passive stretch were performed in order to increase flexibility of bilateral calves. This was performed with the patient in prone with her feet hanging off the edge of the mat in order to have her foot on the thigh of the PT to get a passive stretch. Lotion was applied to both calves in order

to reduce friction. AP mobilizations to the talocrural joint were performed in order to promote and increase dorsiflexion. This was done in supine with ankles supported up on half a foam roller with the PT holding onto the malleoli and mobilizing at the talus. RBA for the lumbopelvic region was done in order to promote neutral pelvis/spine and to decrease pain with functional movements. Please refer to Appendix 1 for detailed list of interventions performed during each visit. There is limited research out there about specific plan of care for idiopathic toe walkers, especially if they are an older adolescent. It has been reported though that conservative treatment of idiopathic toe walking should consist of passive stretching of the plantarflexors and night splinting. Serial casting is also recommended with a program consisting of passive stretching, active exercises of plantarflexors, and strengthening exercises for the dorsiflexors following the casting. A dorsiflexion-assist AFO can also be recommended to help promote a heel to toe gait pattern².

OUTCOMES

At the end of the initial 8 weeks, the patient had improvements with range of motion, improved mobility, increased hip/core strength and stability, and decrease of pain with functional activities. The patient will continue to receive care at physical therapy clinic to further improve upon progress in order to reach goals made. Throughout treatment, there were some modifications and discontinuation of interventions. With side plank exercise, the plank has to be modified by having the patient on the knees instead of the feet due to it being harder for her to perform. This modification was kept throughout the duration of treatment. There was a discontinuation left hip IR and posterior mobilizations due to making the patients pain worse.

Overall, the patient was compliant in performing her HEP and was motivated to participate in therapy at the clinic. The patient was able to tolerate exercises well and once the patient progressed to a point where the exercises were easy for her to complete, the exercises were progressed to challenge the patient. With treatment, there was an overall decrease in pain with functional activities and the patient gave great description on how she was feeling each day (Appendix 1). There was a decrease in pain rating from the initial evaluation of a 7/10 to the last treatment day, in which the patient rated her pain was currently at a 1/10. The level of pain tended to trend downwards as treatment progressed, the only caveat to this was the second to last session in which the patient had an increase in pain. The patient rated her pain this day a 5/10 but attributed the increase to it being the first day of school and she was not used to sitting at a desk for extended periods of time. The patient saw an increase in her LEFS score, rating it a 69/80 on the last session. The patient scored 6 points on the Foot Posture Index bilaterally. Table 3 shows the ROM reassessment taken during the last session.

DISCUSSION

Idiopathic toe walking is a pathology that has been shown to resolve with time and with both conservative and surgical intervention. It has been shown that passive stretching of the plantarflexors, active exercises of the plantarflexors, and strengthening exercises of the dorsiflexors to help improve a normal gait pattern. The therapeutic exercise and therapeutic activity/manual therapy performed on this patient followed this trend. The use of RBA was also used due to the fact that the patient was having pain up the lower extremity chain and into the low back. With all interventions, we saw an increase in ROM, increase in strength, and decrease in pain when performing functional activities. All of the gains the patient made so far are going to help her achieve a normal gait pattern.

The main challenge and consideration to make with this patient is that she had a flexible gait pattern. At therapy, she would walk with a normal gait pattern and would not walk on her toes. At home her parents reported that the patient would constantly be walking on her toes. The strengths in the approach used was the focus on the overall LE chain and treating the symptoms the patient was having and using a wide variety of interventions. The weakness to the approach we used were not having sufficient research to back the interventions and having specific outcome measurements for this pathology. The most important finding was that the patient made significant improvement with specifically DF and hip IF ROM and increasing overall strength to help decrease the functional limitations preventing her from having a normal gait pattern. The biggest limitation this point is that the patient is going to have to make it a habit to walk with a normal gait pattern and to consciously think about how she is walking to try and correct her gait pattern. There is a lack of research involving the specific interventions and treatment for idiopathic toe walkers. There is much opportunity to learn in this area about what interventions

this patient population would benefit from most and what the best approach would be, either focusing on the whole LE chain or just the ankle.

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TABLES AND FIGURES

Actie ROM at Initial Evaluation		
	Right	Left
DF	Lacking 5 degrees	Lacking 8 degrees
PF	83 degrees	75 degrees
Inversion	25 degrees	30 degrees
Eversion	27 degrees	22 degrees
Hip IR	30 degrees	21 degrees
Hip ER	90 degrees	90 degrees

Table 1

MMT at Initial Evaluation		
	Right	Left
Inversion	5/5	5/5
Eversion	5/5	5/5
DF	4/5	4/5
PF	5/5	5/5
Hip extensors	4/5	4-/5
Hip abductors	4-/5	4-/5
Transverse Abdominals	30 degrees	

Table 2

ROM Reassessment at Last Session		
	Right	Left
DF	7 degrees	6 degrees
PF	64 degrees	65 degrees
Inversion	23 degrees	30 degrees
Eversion	38 degrees	32 degrees
Hip IR	43 degrees	41 degrees

Table 3

APPENDIXES

Summary of Interventions and Pain Descriptions per Visit			
Visit	Therapeutic Exercise	Therapeutic Activity/Manual Therapy	Pain Description
1	<p>Hamstrings stretch 2x30''*</p> <p>Standing gastroc and soleus stretch 2x30''</p> <p>Bilateral bridges 2x10**</p> <p>Bilateral clamshells 2x10</p> <p>SLR in Abduction and extension bilaterally 1x10</p>		7/10
2	<p>Hamstrings stretch 2x30''</p> <p>Standing gastroc and soleus stretch 2x30''</p> <p>Bilateral bridges 2x10</p> <p>Bilateral clamshells 2x10</p> <p>SLR in Abduction and extension bilaterally 1x20</p> <p>TA Activation 1x10</p> <p>w/ LE 1x10</p> <p>w/ UE 1x10</p>	<p>-STM/IASTM to bilateral calves with passive stretch</p> <p>-A/P mobilization of bilateral talocrural joints</p>	Sore after last session, feeling better
3	<p>Hamstrings stretch 2x30''</p> <p>TA Activation 1x10</p> <p>w/ LE 2x10</p>	<p>-STM/IASTM to bilateral calves with passive stretch</p> <p>-A/P mobilization of bilateral talocrural joints</p>	Reports she feels good today

	<p>w/ UE 1x10</p> <p>Dead Bugs 2x5</p> <p>Front planks 2x30"</p> <p>Side planks bilaterally 1x30"</p> <p>Heel walking 3 laps</p> <p>Wall squats 2x10</p>		
4	<p>Bilateral bridges 3x10</p> <p>Bilateral clamshells 3x10</p> <p>TA activation w/ UE 2x10</p> <p>TA activation w/LE 2x10</p> <p>Dead bugs 4x5</p> <p>Front planks 2x45"</p> <p>Side planks bilaterally 2x30" modified on knee</p> <p>Heel walking 4 laps***</p> <p>Wall squats 3x10</p>	<p>-STM/IASTM to bilateral calves with passive stretch</p> <p>-A/P mobilization of bilateral talocrural joints</p>	<p>Feels good today, sore from exercises</p>
5	<p>Bilateral bridges 3x10</p> <p>Bilateral clamshells 3x10</p> <p>TA activation w/ UE 2x10</p> <p>Dead bugs 3x10</p> <p>Front planks 50", 38"</p> <p>Side planks bilaterally R 56", 1'20"****; L 41", 35" modified on knee</p>	<p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique</p>	<p>Increased soreness in L posterior hip/low back, took medication</p>

	Wall squats 4x10		
6	<p>Bilateral bridges 3x10</p> <p>Bilateral clamshells 3x10 w/</p> <p>Dead bugs 3x10</p> <p>Front planks 30", 33"</p> <p>Side planks bilaterally R 56", 48"; L 46", 31" modified on knee</p> <p>Wall squats 4x10</p>	<p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique. Addition of left hip IR and posterior mobilizations.</p>	Felt same as last time
7	<p>Bilateral bridges 3x10</p> <p>Bilateral clamshells 3x10 w/ yellow theraband around knees</p> <p>Dead bugs 3x10</p> <p>Front planks 34", 34"</p> <p>Side planks bilaterally R 1'05", 1'03"; L 56", 59" modified on knee</p> <p>Wall squats 4x10</p> <p>Heel walking 3 laps</p>	<p>-STM/IASTM to bilateral calves with passive stretch</p> <p>-A/P mobilization of bilateral talocrural joints</p> <p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique. Discontinued hip mobilizations.</p>	More pain today in hip, same pain she has been having but aggravated more
8	<p>Bilateral bridges 3x10</p> <p>Bilateral clamshells 3x10 w/ yellow theraband around knees</p> <p>Dead bugs 3x10</p>	<p>-STM/IASTM to bilateral calves with passive stretch</p> <p>-A/P mobilization of bilateral talocrural joints</p> <p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique</p>	Felt good after last session, experiencing less soreness overall, especially in the hip

	<p>Front planks 40", 13", 14"</p> <p>Side planks bilaterally R 1'13", 59"; L 1', 23" modified on knee</p> <p>Squats 3x10</p> <p>Heel walking 4 laps</p> <p>Yellow Theraband Inversion Exercise 2x10</p>		
9	<p>Bilateral bridges 3x10</p> <p>Bilateral clamshells 3x10 w/ yellow theraband around knees</p> <p>Dead bugs 3x10</p> <p>Front planks 40", 32"</p> <p>Side planks bilaterally R 1'16", 1'05"; L 1'05", 41" modified on knee</p> <p>Squats 3x10</p> <p>Heel walking 4 laps</p> <p>Yellow Theraband Inversion Exercise 3x10</p>	<p>-STM/IASTM to bilateral calves with passive stretch</p> <p>-A/P mobilization of bilateral talocrural joints</p> <p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique</p>	Slight increase in pain, overall still better than it has been
10	<p>Bilateral bridges 3x10</p> <p>Bilateral clamshells 3x10 w/ yellow theraband around knees</p> <p>Dead bugs 3x10</p>	<p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique. Addition of left lumbar roll.</p>	Feeling good, no increase in pain

	<p>Front planks 50", 16", 14"</p> <p>Side planks bilaterally R 1'11", 1'20"; L 1'08", 1'03" modified on knee</p> <p>Yellow Theraband Inversion Exercise 3x10</p> <p>Yellow Theraband Dorsiflexion Exercise 3x10</p>		
11	<p>Bilateral bridges 3x10</p> <p>Bilateral clamshells 3x10 w/ yellow theraband around knees</p> <p>Dead bugs 3x10</p> <p>Front planks 32", 42"</p> <p>Side planks bilaterally R 1'16", 1'21"; L 1'14", 1'23" modified on knee</p> <p>Squats 3x10</p> <p>Heel Walking 5 laps</p> <p>Yellow Theraband Inversion Exercise 3x10</p> <p>Yellow Theraband Dorsiflexion Exercise 3x10</p> <p>Bird dog progressions starting with just arms 2x10</p>	<p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique, left lumbar roll</p>	<p>Feels good, no complaints of pain</p>
12	<p>Bilateral bridges 3x10</p>	<p>-STM/IASTM to bilateral calves with passive stretch -A/P mobilization of bilateral</p>	<p>Not having much pain</p>

	<p>Bilateral clamshells 3x10 w/ red theraband around knees</p> <p>Dead bugs 2x10</p> <p>Front planks 53", 33"</p> <p>Side planks bilaterally R 1'32", 1'15"; L 1'32", 1'25" modified on knee</p> <p>Squats 3x10</p> <p>Yellow Theraband Inversion Exercise 3x10</p> <p>Yellow Theraband Dorsiflexion Exercise 3x10</p> <p>Bird dog progressions starting with just arms 2x10</p>	<p>talocrural joints</p> <p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique, left lumbar roll</p>	<p>anywhere, rates pain 2/10</p>
13	<p>Single leg bridges, bilaterally 1x15</p> <p>Bilateral clamshells 3x10 w/ red theraband around knees</p> <p>Dead bugs 2x10</p> <p>Front planks 38", 43"</p> <p>Side planks bilaterally R 1'10", 1'30"; L 1'24", 1'35" modified on knee</p> <p>Squats with 11lb weight under toes to elevate foot 3x10</p> <p>Heel Walking 5 laps</p>	<p>-STM/IASTM to bilateral calves with passive stretch</p> <p>-A/P mobilization of bilateral talocrural joints</p> <p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique, left lumbar roll</p>	<p>Hip has been hurting while walking while on vacation, had to take ibuprofen. Did not complete exercises while on vacation</p>

	<p>Yellow Theraband Inversion Exercise 3x10</p> <p>Yellow Theraband Dorsiflexion Exercise 4x10</p> <p>Bird dog progressions</p> <p> with just arms 2x10</p> <p> with just legs 1x10</p>		
14	<p>Single leg bridges, bilaterally 2x10</p> <p>Bilateral clamshells 3x10 w/ red theraband around knees</p> <p>Dead bugs 2x10</p> <p>Front planks 34", 35"</p> <p>Side planks bilaterally R 1'19 1'30"; L 1'01", 1'11" modified on knee</p> <p>Squats with 11lb weight under toes to elevate foot 3x10</p> <p>Heel Walking 6 laps</p> <p>Yellow Theraband Inversion Exercise 3x10</p> <p>Yellow Theraband Dorsiflexion Exercise 4x10</p> <p>Bird dog progressions</p> <p> with just arms 2x10</p> <p> with just legs 2x10</p>	<p>-STM/IASTM to bilateral calves with passive stretch</p> <p>-A/P mobilization of bilateral talocrural joints</p> <p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique, left lumbar roll</p>	<p>Hip/back are not hurting today, states her L lateral calf has been hurting with both DF and PF, rates pain 2/10</p>

15	<p>Single leg bridges, bilaterally 2x10</p> <p>Bilateral clamshells 3x10 w/ red theraband around knees</p> <p>Dead bugs 2x10</p> <p>Front planks 1'23", 49"</p> <p>Side planks bilaterally R 1'38", 1'36"; L 1'28", 1'54" modified on knee</p> <p>Squats with 1lb weight under toes to elevate foot 3x10</p> <p>Heel Walking 5 laps with hurdles</p> <p>Yellow Theraband Inversion Exercise 4x10</p> <p>Yellow Theraband Dorsiflexion Exercise 4x10</p> <p>Bird dogs 2x10</p>	<p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique, left lumbar roll</p>	<p>Today was first day of school and has had increase in pain due to sitting for prolonged periods of time, 5/10</p>
16	<p>Single leg bridges, bilaterally 2x10</p> <p>Bilateral clamshells 3x10 w/ red theraband around knees</p> <p>Dead bugs 2x10</p> <p>Front planks 1'28", 1'08"</p> <p>Side planks bilaterally R 1'15", 1'15"; L 1'46, 1'34"</p>	<p>-RBA to include lumbar PA mobilization, left reverse lumbar roll, bilateral grand roll, shotgun technique, left lumbar roll</p>	<p>Still having pain at school that is about 5/10, current pain is 1/10</p>

	modified on knee Heel Walking 6 laps with hurdles Yellow Theraband Inversion Exercise 4x10 Yellow Theraband Dorsiflexion Exercise 4x10 Bird dogs 2x10		
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Appendix 1

* '' Indicates seconds

** 1x10- the 1 represents the number of sets; x10 indicates the number of reps

*** 1 lap = 36ft

**** ' Indicates minutes