

Toe Walking in Children

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Abstract

Toe walking pattern of gait is often seen in toddlers and can persist into early childhood. A detailed assessment is warranted in children that presents after 5 years of age with persistent TW. Treatment varies from simple reassurance and physiotherapy to orthotics, casting and sometimes surgery. Prognosis of surgery is good in select cases.

Keywords: Toe Walking, Idiopathic, Neurology, Treatment

Introduction

Toe walking (TW) or pes equinus is a common presentation in pediatric clinics and causes parental concerns and anxiety. The vast majority of children have idiopathic TW, that is, no known cause is present, but a thorough history and examination are required to rule out pathological causes.

Epidemiology

Most children walk by 12–18 months and the incidence TW varies from 7% to 24%. The initial toe-heel pattern of gait persists until age 3 years and then most children develop the normal heel-toe pattern. More than half the children that toe walk improve spontaneously by age 5 years. Rarely, idiopathic toe-walking persists beyond 5 years [Fig. 1].

Causes of TW

The calf muscle originates behind the femoral condyles and inserts in the heel/calcaneus bone. The most common cause of TW is a short or contracted calf

muscle. TW can be associated with various neuromuscular disorders such as cerebral palsy, muscle dystrophy, spinal cord abnormality, or neurological disorders. Spasticity, dystonia, and calf hyperactivity as seen in autistic children are common underlying features in pathological TW.

Approach to Child with TW

Initial diagnostic clues can come from birth history and developmental milestones. A pre-term birth, history of birth hypoxia or seizures, delay in motor development all points to an underlying neurological cause of TW.

Often, parents give walking aids in term born children before 8 months to facilitate early ambulation, and this can cause over-firing of calf muscle, leading to ITW later.

A thorough examination of the child is required to exclude organic causes of TW. Spine and peripheral extremities must be examined to rule out signs of spinal dysraphism, muscle dystrophy,

and spasticity. Poor eye contact, jittery attitude of child, and abnormal behavior are attributed to autism spectrum or sensory processing disorder.

Children that have idiopathic toe walking (ITW) are sometimes able to walk flat-footed on command and can also stand with their heel touching the ground. This is because the muscle is flexible and the child is aware of the toe walking pattern. As walking is an involuntary act, as soon as the child is allowed to walk freely the toe-heel pattern is prominent. This is a flexible toe walking as compared to a child who has stiff muscles and is constantly on his toes, even while standing still. This is due to shortening of the calf muscle due to contracture. Children may complain of fatigue pain, or foot pain, but most of them are asymptomatic and unaware of their gait pattern. It is the parental concern and persistence that insists an evaluation and remedy. Imaging and EMG/NCV are required when abnormal clinical signs are present to rule out pathological causes of TW.

Treatment

The decision to treat is based on the age of the child and flexibility of the calf muscle. The initial treatment is always conservative and reassurance.

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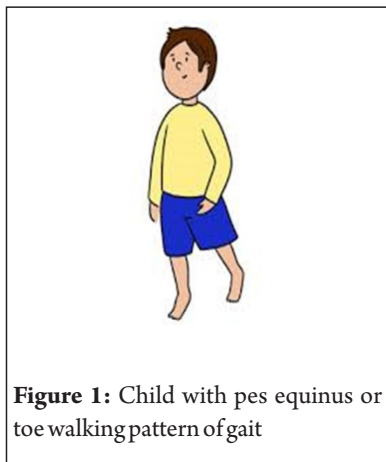


Figure 1: Child with pes equinus or toe walking pattern of gait

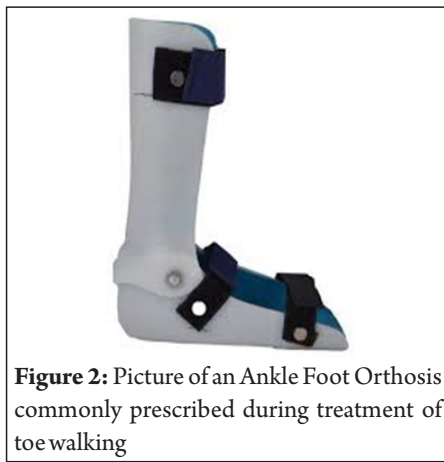


Figure 2: Picture of an Ankle Foot Orthosis commonly prescribed during treatment of toe walking

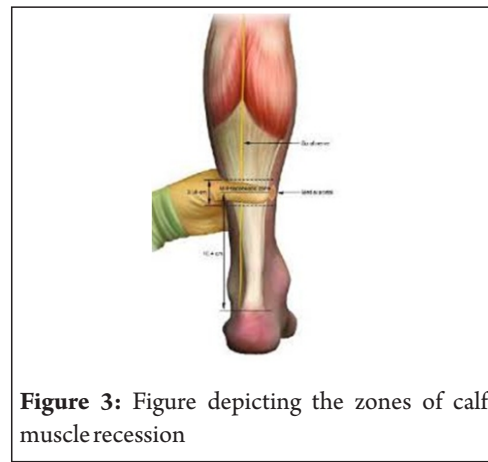


Figure 3: Figure depicting the zones of calf muscle recession

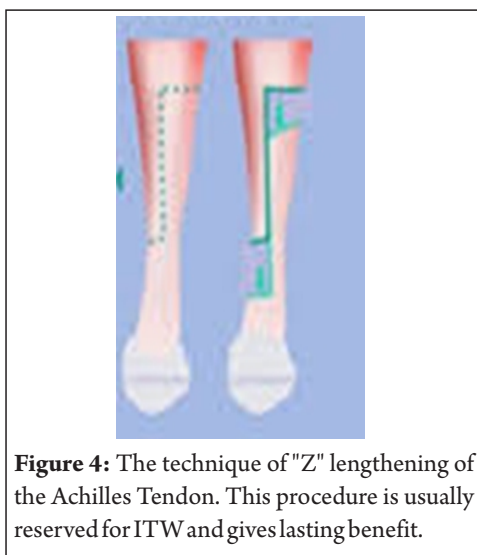


Figure 4: The technique of "Z" lengthening of the Achilles Tendon. This procedure is usually reserved for ITW and gives lasting benefit.

Non-surgical treatment

Observation: Periodic clinic visits are recommended in toddlers to assess the improvement in TW. Stretching exercises are recommended and physiotherapy is the cornerstone of at every stage to treat and prevent relapse.

Orthotics: Children above 5 years, having flexible calf, are also given an orthosis. A dynamic ankle-foot-orthosis with plantar-flexion stop or dorsiflex assist hinge is given to stretch the calf during daytime. [Fig. 2]. A static AFO can also be used at night. This dual

approach is effective in most children. The exact duration of orthosis to treat TW has not been ascertained, but 12 h in the entire day is reasonable. Orthosis have to be worn for 12–18 months to prevent relapse.

Serial casting: Series of short leg walking casts is applied in the clinic setting. These are good in flexible and semi-rigid toe walkers to stretch the calf muscles. Casting helps to progressively stretch and lengthen the calf muscle and also to break the pattern of TW. Approximately 3–4 casts are required followed by orthosis.

Botulinum toxin injection: In a small subset of children with TW, Botulinum toxin is useful to cause local muscle relaxation which, then, yields with casting. Children with spastic calf muscles will benefit the maximum, although it has also been used in ITW. Even serial casting can be combined after botulinum injection in semi-rigid cases. The compliance with orthosis is also better once the muscle is relaxed. [Fig. 3].

Surgical treatment

Calf muscle lengthening by muscle recession or "z" plasty of Achilles tendon is reserved for older children that have

symptomatic TW and those that have failed conservative treatment.

The type of surgery depends on the underlying diagnoses. Muscle recession is reserved mainly for spastic calf muscles to prevent weakening of plantar-flexion extension couple. The result is generally good and improves with physiotherapy and orthosis.

The Tendoachilles lengthening either percutaneous or open "Z" plasty gives excellent results in the long term, especially for idiopathic toe walkers, where the proximal muscle power is normal. An above knee cast is required for 4–6 weeks followed by walking ankle boot. Orthosis is mainly required for 6 months or until calf muscle regains anti-gravity strength. [Fig. 4].

Conclusion

Idiopathic Toe Walking (ITW) is a diagnosis of exclusion. Persistent toe walking in school years needs evaluation by specialist. Treatment is directed mainly at the underlying cause and needs a multidisciplinary approach

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Conflict of Interest: NIL; **Source of Support:** NIL

References

1. Sala DA, Shulman LH, Kennedy RF, Grant AD, Chu M. Idiopathic toe-walking: A review. Dev Med Child Neurol 1999;41:846-8.
2. van Kuijk AA, Kusters R, Vugts M, Geurts AC. Treatment for idiopathic toe walking: A systematic review of the literature. J Rehabil Med 2014;46:945-57.
3. Engström P, Tedroff K. The prevalence and course of idiopathic toe-walking in 5-year-old children. Pediatrics 2012;130:279-84.

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