

Effect of intrinsic foot muscle exercise on mobility and prevention of progressive misalignment in Hallux valgus

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Abstract :-

Background: Lateral deviation of the great toe at the first metatarsophalangeal (MTP) joint is the characteristics of hallux valgus common forefoot deformity. Progressive deformity may impair foot function and quality of life, although mild cases are often asymptomatic. Early conservative physical therapy can help strengthen the intrinsic foot muscles and prevent progression of the condition.

Presentation of Case: A female patient, age 20, had a slight hallux valgus deformity that did not lead to any discomfort or functional limitations. On clinical examination a hallux valgus angle of 16° was noted, along with mild intrinsic foot muscle weakness, full pain-free MTP joint range of motion and a normal gait. The patient was concerned about the appearance of the deformity and progression

Intervention: Two weeks of physiotherapy, mainly to strengthen the intrinsic foot muscles. Treatments included short foot exercises, toe spread-out exercises, abductor hallucis strengthening with resistance bands, towel scrunches, and ankle circle exercises. The patient was also advised about appropriate footwear and foot hygiene.

Result:-The patient exhibited improved awareness of foot posture, increased intrinsic foot muscle activation and strength, enhanced foot stability, and a slight improvement in great toe alignment in weight-bearing activity after the intervention. No complaints were recorded during treatment and foot function slightly improved. There was no evidence of progression, however, there was no apparent healing of the deformity.

Conclusion , this case shows that an organized program to strengthen the intrinsic muscles of the foot may improve foot function and stability and prevent the progression of moderate asymptomatic hallux valgus. A useful therapeutic approach before a considerable functional impairment and the development of discomfort may be early conservative physical therapy.

key words:- Hallux valgus, conservative Management, intrinsic muscle, strengthening exercise

Background:-

Hallux valgus is one of the most frequent foot deformities in humans. It hurts, makes it difficult to walk and can make it hard to pick out the right shoes. It is defined as a lateral displacement of the great toe away from

the midline at the metatarsophalangeal joint.

The name was first used in 1870 by Carl Heuter, a German surgeon, who recognized that the condition was due to angulation of the joint and not simply a growth problem. It is frequent in women over middle age and rare even in young women.

Epidemiology :- The cause of this disease is not known; the lifestyle determines the genetic predisposition. According to one study, 94% of respondents had a family history of the disease. Soft tissue, joints, and bone are the tentative factors that are genetic but have not been confirmed yet.

Prevalence:- The prevalence of the hallux valgus deformity is unknown. It is much more common in societies where footwear is worn, but it is probably only 2% among populations that go regularly barefoot. As women often wear small shoes or high heels, they constitute the majority of cases. Middle-aged and older people are more likely to suffer from this condition. Less often, it may also be caused by inflammatory diseases or trauma.

Etiology :- Hallux valgus may have several different causes that may either be intrinsic or extrinsic. The former is mainly genetic and linked with increased first ray (hallux metatarsal) mobility at the level of the medial cuneiform ligamentous apparatus. This tendency is often associated with Marfan syndrome, Ehlers-Danilo's syndrome, or other collagen diseases. The cause of the deformity is considered to be an improper shoe fit resulting from aberrant loading of the first metatarsal head with valgus force. At the same time, the number of female patients with hallux valgus is 15 times higher than that of male patients

Clinical Manifestation:- The patient may present with a complaint of a painless medial bulging as the only manifestation. Still, most patients report discomfort that is relieved when walking barefoot or in open shoes. This discomfort is aggravated by ill-fitting shoes. The patient may complain of the anterior flatfoot stage of the disease as an early clinical manifestation. The anterior transverse flatfoot is a frequent accompanying feature of hallux valgus. The complaint may also include pain in the region of the bunion due to pressure on the skin and shoe toe, as well as osteoarthritis of the MTP joint

Treatment :-

Surgical:-

1. Kellers operations
2. Mayo operations
3. Arthroplasty
4. Arthrodesis

Conservative:-

If the deformity found is mild, the following conservative treatments are indicated:

1. Passive, relaxing stretching of the great toe abductor;
2. Sustained strengthening of the intrinsic muscles of the foot;
3. Properly selected weight-bearing;
4. Footwear modification
5. A faraday foot bath is indicated.

Scope of the study:-

The study aimed to improve the conservative treatment of hallux valgus by strengthening program The study determined the effectiveness of strengthening the intrinsic and extrinsic muscles of the foot.

Uniqueness of study

The study recommended early conservative management of hallux valgus deformity by focusing on strengthening exercises rather than surgical interventions. The study highlighted the role of exercise therapy in restoring functional movements for normal activities and preventing progressive deformity.

Case Description:-

The patient is a 20 years old female presenting with a noticeable deviation of the big toe towards the second toe. She reported no discomfort, but she was concerned about the appearance and the possible development of the deformity. The patient reported that over the last one or two years, she has been observing a slight deviation of her big toe. She did not experience any pain while walking, running, or other activities. The patient denied any history of inflammatory arthritis, injury, or previous surgery. The patient further denied any functional limitation; however, she complained of discomfort when she wore tight footwear. On observation, There was a slight lateral deviation of the hallux towards the second toe. There was also a mild elevation of the toe on the medial aspect of the first MTP joint. No reddened skin, swelling, or callus formation. Normal feet posture.

Outcome Measures:

Hallux Valgus Angle: 16°

Foot Function Index: Minimal or no disability

Foot Intrinsic Muscle Strength: Weak

Toe alignment: Mild hallux valgus

Diagnosis: Mild hallux valgus with no pain and functional limitation due to weakness of the intrinsic foot muscles.

Goals of treatment:-

1. To strengthen the intrinsic muscles of the foot.
2. To maintain full range of motion at the first MTP joint
3. To restore foot stability and alignment
4. To prevent the progression of the deformity
5. To educate the patient about the appropriate management of the deformity and self-care.

Physiotherapy Interventions:-

Physiotherapy will be performed under the guidance of a specialist and will consist of a series of therapeutic exercises:

Short Foot Exercise:

The patient sits or stands and places the foot on the floor. In order to lift the arch of the foot, the patient attempts to pull the toes back and towards the heel, without crumpling or curling them. This is done by tightening the deep intrinsic muscles in the feet.

Repetition:- 5 sec x10-15 reps.



Toe Spread out:

Sitting or standing, the patient pushes the ball of their foot into the floor hard enough to feel a stretch in their toes. Then, the patient tries to spread all their toes apart as far as possible.

Repetition:- 5 sec x10-15 reps.



Abductor Hallucis strengthening

A resistance band is placed around the big toes of both feet. The heels are brought together, and the feet are placed on the floor. The big toes are pulled away from each other in opposition to the band's resistance

Repetition:- . 2-3 x10-12 reps.



Towel scrunches – Sitting on a chair with legs hanging down, the patient places a small towel on the floor in front of them. The heel remains in contact with the floor while the toes are used to scrunch up the towel. This causes the towel to travel towards the body

Repetition:- . 2-3 x10 reps.



Ankle circles exercise – The patient can sit, stand, or lie down; lift one leg slightly and make a circle with the ankle in one direction. The patient can use the big toe or other toes to trace an imaginary alphabet in the air. This is an excellent exercise that helps to improve range of motion, flexibility, and circulation, preventing injuries and stiffness.

Repetition:- 0-15 x each direction.

Result:

The patient showed early improvement in foot muscle control and stability after two weeks of exercise combined with a physiotherapy program. This program included intrinsic foot muscle strengthening, toe spreading, towel scrunches, short foot exercises, abductor hallucis strengthening, and ankle circle exercises.

Outcome Measure:-

Measurement	per intervention	Post intervention
Foot Function test	Minimal disability	Slight improvement
Foot intrinsic muscle strength	Weak	Improve
Toe alignment	Mild hallux valgus	No visible changes

Discussion:-

The present case study showed that a structured physiotherapy program mainly focus on foot intrinsic muscle strengthening exercise to increase mobility, muscle strength and prevention of progression of deformity . These finding are supported by KAMILA MORTKA MSc, Przemyslaw Lisinski MD, PhD.3303-3307,2015 who said that the physiotherapy approach should primarily concentrate on pain relief and improvement of foot function and secondary correction of deformity.

Similar recommendation are provided by Kim MH,Yi CH, Weon JH,et al.: 2015 1019-1022 and

Kim MH ,Kwon OY,Kim SH,et al 2013 26:163-168 who recommended short foot and toe spread out exercise to improve strength,mobility in patient with Hallux valgus.

Conclusion:

This case study suggests that a structured physiotherapy program which focuses on strengthening and stabilizing the intrinsic foot muscles can help improve foot stability, mobility, and great toe alignment in a young adult with mild asymptomatic hallux valgus deformity. Although the deformity was not completely corrected, the intervention seemed to prevent its progression and improve overall foot function. Conservative management may be an effective early treatment approach for individuals with mild hallux valgus, especially when started before pain and significant functional limitations occur.

Reference:-

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