Clinical Research on Foot & Ankle

Opinion Open Access

Flatfoot (Pes Planus): A Comprehensive Overview of Causes, Diagnosis, and Management

Priya Mehta*

Department of Physical Therapy, Sunrise Orthopedic Institute, India

Introduction

Flatfoot, also known as pes planus, is a common condition characterized by the flattening or collapse of the foot arch. It can be congenital or acquired and ranges from asymptomatic to causing significant pain and disability. This article provides a detailed overview of the etiology, clinical presentation, diagnostic methods, and both conservative and surgical management strategies for flatfoot [1]. Flatfoot is a musculoskeletal condition affecting the medial longitudinal arch of the foot. It occurs when the arch either fails to develop properly during childhood (congenital) or collapses later in life due to injury, overuse, or degenerative conditions (acquired) [2]. Although many individuals with flatfoot are asymptomatic, others experience foot pain, gait abnormalities, and functional impairment.

Flatfoot, also known as pes planus, is a condition in which the arch of the foot collapses, causing the entire sole to come into complete or near-complete contact with the ground [3]. It can be congenital (present at birth) or acquired later in life. Flatfoot is common in children and often resolves naturally, but in adults, it can sometimes cause pain, discomfort, and mobility issues. Management depends on the severity and symptoms of the condition. Flatfoot, medically referred to as pes planus and is a common foot deformity characterized by the partial or complete collapse of the foot's arch [4]. This condition can be congenital (present at birth) or acquired over time due to various factors such as injury, aging, or underlying medical conditions. Flatfoot can affect one or both feet and may range from asymptomatic cases to severe deformities that cause pain, gait abnormalities, and reduced mobility [5]. In a normally structured foot, the medial longitudinal arch plays a vital role in weight distribution, shock absorption, and propulsion during walking. When this arch flattens or fails to develop properly, the foot's biomechanics become compromised, potentially leading to misalignment, fatigue, and secondary issues such as knee, hip, or back pain [6]. Flatfoot is categorized into flexible and rigid types. Flexible flatfoot is typically benign in children and may self-correct with age, whereas rigid flatfoot is often linked to underlying pathology and may require intervention.

The prevalence of flatfoot varies widely across age groups. It is particularly common in infants and toddlers due to the presence of a fatty pad in the arch region, which typically resolves as the musculoskeletal system matures [7]. However, in adults, acquired flatfoot, often associated with posterior tibial tendon dysfunction (PTTD), can lead to progressive arch collapse and chronic pain. Risk factors for adult-acquired flatfoot include obesity, diabetes, inflammatory arthritis, and repetitive trauma [8]. Diagnosing flatfoot involves a comprehensive evaluation that includes clinical examination, gait analysis, and imaging studies such as X-rays, MRI, or CT scans to assess bone alignment and soft tissue integrity. Management strategies for flatfoot range from conservative approaches, such as orthotic devices, physical therapy, and anti-inflammatory medications, to surgical intervention for severe or progressive cases.

Anatomy and biomechanics of the foot arch

The medial longitudinal arch consists of the calcaneus, talus, navicular, cuneiforms, and the first three metatarsals. Several soft tissue structures, including the posterior tibial tendon, plantar fascia, and spring ligament, provide support and stability.

Normal arch- Maintains weight distribution and absorbs impact.

Flatfoot- Leads to excess pronation, reducing shock absorption and altering gait mechanics.

Flatfoot can be categorized into-

Congenital flatfoot- Present at birth, caused by developmental anomalies.

Flexible flatfoot- Foot arch appears normal when non-weight-bearing but flattens underweight.

Rigid flatfoot- The arch remains flat even when non-weight-bearing, often due to tarsal coalition or other structural deformities.

Acquired flatfoot- Develops over time, often due to degeneration or injury.

Adult-acquired flatfoot deformity (AAFD) - Often caused by posterior tibial tendon dysfunction (PTTD).

Flatfoot secondary to arthritis or trauma- Associated with joint degeneration or injury.

Causes and risk factors

Several factors contribute to the development of flatfoot-

Genetics- Inherited foot structure abnormalities.

Ligament laxity- Increased joint flexibility (common in children and individuals with Ehlers-Danlos or Marfan syndrome).

Posterior tibial tendon dysfunction- A leading cause of adult-acquired flatfoot.

Obesity- Increases mechanical stress on the arch.

Aging- Degeneration of foot-supporting structures.

Neurological conditions- Cerebral palsy or muscular dystrophy can lead to muscle imbalance and flatfoot.

***Corresponding author:** Priya Mehta, Department of Physical Therapy, Sunrise Orthopedic Institute, India, E-mail: priya.mehta@gmail.com

Received: 01-Feb-2025, Manuscript No. crfa-25-163470; **Editor assigned:** 03-Feb-2025, Pre-QC No. crfa-25-163470 (PQ); **Reviewed:** 17-Feb-2025, QC No. crfa-25-163470; **Revised:** 21-Feb-2025, Manuscript No. crfa-25-163470 (R); **Published:** 26-Feb-2025, DOI: 10.4172/2329-910X.1000623

Citation: Priya M (2025) Flatfoot (Pes Planus): A Comprehensive Overview of Causes, Diagnosis, and Management. Clin Res Foot Ankle, 13: 623.

Clinical Presentation and Symptoms

Symptoms vary based on the severity and cause of flatfoot, including-

Foot pain- Common along the inner arch or ankle.

Swelling- Around the inside of the ankle, especially in adult-acquired cases.

Gait abnormalities- Individuals may develop overpronation or an antalgic gait.

Reduced mobility- Difficulty in walking or standing for prolonged periods.

Footwear challenges- Trouble finding comfortable or properly fitting shoes.

Diagnosis

Diagnosis of flatfoot involves a thorough history, physical examination, and imaging studies.

Inspection- Assess foot shape and alignment while standing and walking.

Jack's Test- Passive dorsiflexion of the big toe; if the arch rises, the flatfoot is flexible.

Single-Leg Heel Rise Test- Inability to raise the heel may indicate posterior tibial tendon dysfunction.

X-ray- Reveals structural deformities, misalignment, or arthritis.

MRI or CT scan- Used for soft tissue assessment, including tendon abnormalities or tarsal coalition.

Management strategies

Treatment for flatfoot depends on the severity, symptoms, and underlying cause.

Arch-supporting insoles or custom orthotics reduce symptoms by redistributing pressure.

Motion-control shoes improve stability.

Stretching and strengthening exercises for the posterior tibial tendon and intrinsic foot muscles.

Balance training and gait re-education.

Reducing weight-bearing activities can alleviate symptoms.

NSAIDs for pain and inflammation management.

For severe or refractory cases, surgery may be necessary-

Tendon repair or transfer- In cases of posterior tibial tendon dysfunction.

Osteotomy- Bone realignment to restore the arch.

Arthrodesis (fusion) - For severe cases with arthritis or joint instability.

Subtalar implant- In pediatric flexible flatfoot cases, an implant may stabilize the joint.

Pediatric flatfoot- Most children with flexible flatfoot remain asymptomatic and do not require treatment.

Adult-acquired flatfoot- Progressive without treatment, but symptoms often improves with orthotic and physical therapy.

Surgical outcomes- Generally favorable, with most patients experiencing symptom relief and improved function.

Prevention and lifestyle modifications

While congenital flatfoot cannot be prevented, acquired flatfoot risk can be minimized by-

Maintaining a healthy weight to reduce arch strain.

Wearing supportive footwear during physical activities.

Performing regular foot-strengthening exercises.

Promptly treating tendon or ligament injuries.

Conclusion

Flatfoot is a common condition with varying degrees of severity and functional impact. Early diagnosis and appropriate management, including orthotic support, physical therapy, and in some cases, surgery, can help alleviate symptoms and improve quality of life. Multidisciplinary care involving physical therapists, podiatrists, and orthopedic surgeons plays a key role in effective management.

Moreover, patient education is fundamental in managing flatfoot effectively. Individuals with flatfoot should be informed about proper footwear, foot-strengthening exercises, and strategies to prevent progression. Healthcare providers, including podiatrists, orthopedic surgeons, and physiotherapists, should collaborate to develop personalized care plans that address the patient's unique anatomical and functional needs.

Ultimately, a multidisciplinary approach that combines preventive care, early intervention, and innovative treatment modalities is essential in enhancing the long-term prognosis for individuals with flatfoot. Ongoing research into the biomechanics of flatfoot and emerging treatment technologies holds promise for further improving patient outcomes and reducing the burden of this common foot deformity.

References

1. Stewart S, Dalbeth N, Vandal AC, Rome K (2016) The first metatarsophalangeal joint in gout: a systematic review and meta-analysis. BMC Musculoskelet Disord 17: 69-96.
2. Polachek A, Li S, Chandran V, Gladman D (2017) Clinical enthesitis in a prospective longitudinal psoriatic arthritis cohort: incidence, prevalence, characteristics and outcome: Enthesitis in psoriatic arthritis. Arthritis Care Res 69: 1685-1691.
3. Koca TT, Göğebakan H, Koçyiğit BF, Nacitarhan V, Yildir CZ, et al. (2019) Foot functions in ankylosing spondylitis. Clin Rheumatol 38: 1083-1088.
4. Koumakis E, Gossec L, Elhai M, Burki V, Durnez A, et al. (2012) Heel pain in spondyloarthritis: results of a cross-sectional study of 275 patients. Clin Exp Rheumatol 30: 487-491.
5. Ozaras N, Havan N, Poyraz E, Rezvanı A, Aydın T, et al. (2016) Functional limitations due to foot involvement in spondyloarthritis. J Phys Ther Sci 28: 2005-2008.
6. Hyslop E, McInnes IB, Woodburn J, Turner DE (2010) Foot problems in psoriatic arthritis: high burden and low care provision. Ann Rheum Dis 69: 928-963.
7. Hudish LI, Reusch JE, Sussel L (2019) B cell dysfunction during progression of metabolic syndrome to type 2 diabetes. J Clin Investig 129: 4001-4008.
8. Jung CH, Son JW, Kang S, Kim WJ, Kim H, et al. (2021) Diabetes fact sheets in korea, 2020: An appraisal of current status. Diabetes Metab J 45: 1-10.