

### DEFINITION

1. **Pes planus (flat foot)** is a term applied to a variation in the normal contour of the foot in which its longitudinal arch is reduced so that, on standing, the medial (inner) border of the foot is close to or touching the ground.

### CLINICAL MANIFESTATIONS

2. The clinical manifestations of flat foot depend upon age of onset and the underlying cause. In children pes planus is symptomless. In adults it is frequently first detected following complaints of fatigue and pain in the feet after unaccustomed strain such as prolonged standing, marching, weight-bearing or the wearing of heavy boots. The pain is usually bilateral and commonly extends along the medial border of the foot and across its dorsum. Calf pain may also be present.
3. As the condition progresses, the foot arches may disappear completely, the feet becoming turned out, with the toes pointing outwards and the gait becoming awkward, stiff and without spring. In advanced cases, osteoarthritis of the small joints of the feet may develop.
4. Where the flat foot is associated with posterior tibial tendon dysfunction (see below), there are characteristic clinical features. Firstly the presence of the “too-many-toes” sign when the foot is viewed from behind, and secondly the inability to initiate standing on tiptoes (heel-rise test); these features indicate abduction deformity of the forefoot and valgus deformity of the hindfoot, hallmarks of the disorder.

### AETIOLOGY

5. Developmental differences in the longitudinal arch of the foot are very common, varying from high arches on the one hand to complete flat foot on the other. There are ethnic differences - in many of the black races, for example, the foot is naturally flat.
6. The foot arches, although present at birth, are not evident, developing within a year or so of learning to stand and walk. The presence of pes planus is normal up to the age of 3 years, when it is referred to as **physiological flat foot**.
7. **Pathological flat foot** is of two types - **congenital** and **acquired**. In **congenital flat foot** the condition presents at or around birth. Two forms are recognised. They are diagnosed on X-ray and are due to structural anomalies arising in utero.
8. **Acquired flat foot** results from several circumstances:

- 8.1 **Static** This is the commonest type of flat foot and is developmental in origin. Factors leading to clinical manifestation are general muscle hypotonus from chronic general illness or rapid growth - particularly of the bones. Other factors include excessive fatigue or strain of muscles in occupations which involve standing or walking for hours, such as nurses, policemen or soldiers. Muscular weakness may also occur in obesity, particularly where there is rapid increase in weight. At rest, the foot may still appear quite normal, with the loss of the arch only apparent on standing. The altered contour may lead to a tendency to walk with the foot turned out.
- 8.2 Another more recently described cause of acquired flat foot in adults is **Posterior Tibial Tendon (PTT) Dysfunction**. This is due to lesions of the tendon of tibialis posterior, which is the prime postural muscle involved in maintaining the medial arch of the foot. It may come to light clinically as an apparently spontaneous rupture or tear of the tendon, or as a chronic tendinitis. There is a characteristic clinical appearance (see para 4 above). There appear to be two main aetiological factors:
  - 8.3 Degenerative change in the tendon. This is the aetiology of PTT dysfunction in most patients, and it may lead to rupture of the tendon. It is associated with a significantly higher incidence of diabetes mellitus, hypertension and obesity. It is common in menopausal women, and in these cases hormonal influences and rapid weight gain have been postulated as triggering factors.
  - 8.4 Excess physical activity. Posterior tibial tendinitis may occur in sports involving intensive prolonged standing, walking and running. It may be precipitated by unaccustomed athletic activity after a long period of rest without proper training.
9. There are other much less common causes of acquired flat foot:
  - 9.1 **Traumatic flat foot** may result from direct or indirect foot injury - for example, with crush injuries of the bones and ligaments of the foot, severe injuries in and around the ankle joint and fractures of the bones of the lower limb remote from the foot and resulting in malalignment.
  - 9.2 **Paralytic flat foot**. Selective paralysis of the postural muscles of the foot from such conditions as poliomyelitis may cause flat foot.
  - 9.3 **Inflammatory flat foot**. Flat foot may rarely result from inflammation and infiltration of the ligaments and plantar fascia of the foot following gonorrhoea, acute rheumatism or rheumatoid arthritis.
10. For normal growth and development of the foot it is accepted that, until the age of 15 years, footwear should be of proper size and shape. There is however no evidence that flat foot arises from, or is aggravated by, unsatisfactory footwear in adults. Climatic factors and mental stress play no part in the cause or course of flat foot.

## CONCLUSION

11. Flat foot, in the majority of cases, is a developmental variation in the longitudinal arch of the foot. Most cases arise in childhood. Some become symptomatic only in adulthood. In recent years posterior tibial tendon (PTT) dysfunction has been identified as an important cause of flat foot in adults.

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