Acquired pes cavus as a manifestation of limited joint mobility in type-1 diabetes mellitus

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As the initial description of striking limitation of extension and flexion of the interphalangeal, metacarpophalangeal, wrist and other large joints, limited joint mobility (LJM) has been recognized as a common complication of both type-1 and type-2 diabetes.[1] It is often associated with short stature, thick tight waxy skin, delayed sexual maturation and early microvascular complications in the older teenagers with long-standing diabetes mellitus (DM). However, acquired pes cavus as a manifestation of LJM is rare and has not been reported previously.

A 13-year-old girl having type 1 DM with irregular compliance and poor glycemic control (HbA1c 10-13%) for the last 8 years, presented with progressively increasing deformity of the feet of 2 years duration. On examination, she had typical features of LJM at interphalangeal joints of hand manifesting as prayers' sign. Interestingly, she also acquired LJM at interphalangeal joints of toes (claw toes) with pes cavus and varus deformities in the feet without wasting of muscles (**Figure 1**). Her vibration perception threshold was 30mV (n<25mV), while other sensory modalities were preserved. Deep tendon reflexes were present except ankle jerks, which could not be elicited possibly due to deformity. Spine and hip joints on clinical examination as well as on radiology did not reveal any abnormalities. X-ray of the right foot showed exaggerated longitudinal arch of foot confirming pes cavus and varus deformities (**Figure 2**). She did not have diabetic retinopathy and her urinary albumin excretion (25mg/day) was normal.

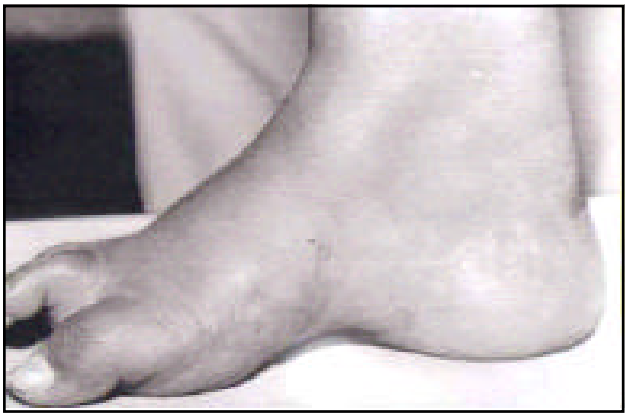

Figure 1 - Limited joint mobility at interphalangeal joints of toes (claw toes) with pes cavus and varus deformities in the feet without wasting of muscles.

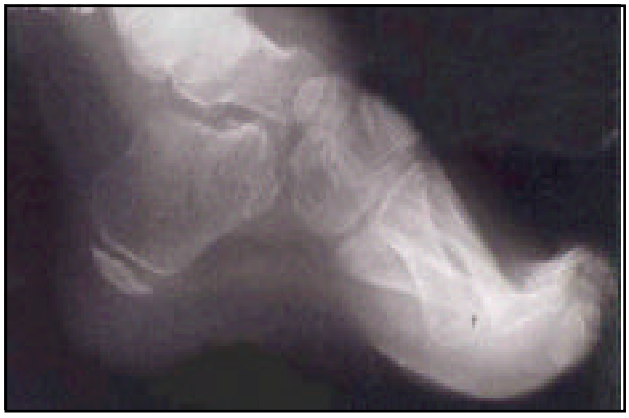

Figure 2 - X-ray of the right foot showed exaggerated longitudinal arch of foot confirming pes cavus and varus deformities.

Milder manifestation of LJM occurs in 25-50% of type 1 and 25-75% of type 2 DM depending on age, duration of diabetes, and the examination techniques. Involvement of large joints as metacarpophalangeal, intertarsal, elbow and ankle is relatively rare.[2] Mild LJM is demonstrated by placing the palm or foot on a flat surface, or in praying position; more subtle changes can be made by goniometer.[3] Detection of mild LJM and the progression to moderate or severe changes, ranges from 3 months to 4 years with mean of 2 years. Presence of LJM is strongly correlated with microvascular complications.[4] This results from abnormal cross-linking and stabilization of glycosylated collagen fibres. The advanced glycation end products (AGE) attract monocyte-macrophages that possess high affinity receptors specific for AGE adducts. The macrophage releases inflammatory cytokines that perpetuate the cycle. As the limitation is painless, mildly disabling even when severe, no specific therapy is required except specially designed footwear.[5] Aminoguanidine, an AGE product inhibitor in animals, has a potential use as a therapeutic modality.[6]

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