Management of the Flexible Flat Foot in the Child: A Focus on the Use of Osteotomies for Correction

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KEYWORDS

• Pes planus • Flat foot deformity • Pediatric • Osteotomy

Pes planus, commonly referred as flat foot, is a combination of foot and ankle deformities. Along with the loss of the medial longitudinal arch, the heel is in various degrees of valgus alignment and the subtalar joint is generally incongruent. The midtarsal joints are abducted with supination of the forefoot. The talar head becomes prominent medially with plantar subluxation and as the navicular moves off the talar head, it becomes progressively uncovered. A valgus deformity of the tibiotalar joint can also be present, the result of chronic compression of the lateral epiphysis, adding to the valgus deformity of the hindfoot. There is no generic deformity, and marked variability not only in the location but also the severity is often present. Some patients may exhibit no abduction of the transverse tarsal joint at all, sometimes there is severe heel valgus, and at times there are combinations of these.

Often these children are asymptomatic, and the flat foot deformity is brought to the attention of a specialist due to the parent's concerns for underlying pathology and future impairment. It is critical that the treating surgeon understand normal variation from true pathology, as well as conditions that have a benign natural history versus those that may lead to significant disability if left untreated. A systematic method for evaluation is required, starting with determination of whether the foot is rigid or flexible. Many conditions that may cause rigid flat foot such as congenital vertical talus, tarsal coalitions, and accessory navicular often follow well-established guidelines for treatment, and are not discussed in this article. The treatment of the flexible flat

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foot, whether painless or painful, requires considerable insight by the surgeon to avoid undue treatment of a benign process but also to avoid neglecting pathology with the potential for disability in adulthood. Is this art or science? Perhaps a bit of both, because there are few well-defined features of the flexible flat foot in the child that determine the need for surgical intervention. One must begin with the assumption that before initiating any treatment, the child should be symptomatic. There is no evidence whatsoever that the use of an orthotic support will change the structure of the arch of the growing foot; however, orthoses certainly should be used if the child is symptomatic, and with some expectation of success. When the child has persistent symptoms, the issue becomes more clouded, because activity will determine the need for subsequent treatment. However, what should one do with a child who has severe flat foot deformity but is entirely asymptomatic? Should one proceed with orthoses, or should one counsel the family on the potential benefits of surgery? There are certain children who are inevitably going to become more symptomatic as an adult, but it is understandably difficult to predict exactly who will be more symptomatic with increasing deformity and who will remain asymptomatic. Perhaps there is a "feel" to this, and one can anticipate that certain deformities will inevitably worsen and therefore require surgery. Common sense clearly supports the indication for a simple procedure, such as an arthroereisis or an osteotomy, performed in the young child as opposed to an arthrodesis in older adolescence or adulthood as the foot becomes more rigid. This approach too is supported in the literature, and these and other issues are discussed in this article.

BACKGROUND

It is important to realize that we are all born with a flat foot. The normal infant foot is devoid of any recognizable arch and is instead filled with abundant fatty tissue. The full development of the normal arch typically occurs around age 5 years but can occur up to the first decade of life. Staheli and colleagues[1] demonstrated that flat foot is normal in infants and common in children. Similarly, Gould and colleagues[2] demonstrated that some level of pes planus was present in all of the toddlers in his study looking at arch development. However, the processes that result in development of the normal arch versus retention of a flat foot deformity into adulthood are not well understood and the natural history is not known.

Several researchers have demonstrated the increased prevalence of flat foot deformity in shod populations. Rao and Joseph[3] studied 2300 children, concluding that flat foot deformity was more often associated with closed toe shoes and less so with sandal/slipper wear and unshod feet. Sachithanandam and Joseph[4] studied 1846 adult persons in India and similarly found the incidence of flat foot to be significantly higher in those that wore shoes before the age of 6 years, suggesting a detrimental association between shoe wear and flat foot. Finally, Harris and Beath,[5] who studied 3600 Canadian recruits, determined that flat foot was not a cause of disability and foot pain in the adult, and suggested that flat foot deformity was normal along a spectrum of normal arch height.

HISTORY AND EXAMINATION

One needs adequate information from the child or parent to determine whether the flat foot deformity is painful or pain free. This population can range from toddlers who cannot reliably participate in history taking to adolescents who may downplay their symptomatology. Therefore, it is important to elicit additional history from the parents. The history should include pain location (if any), intensity, and alleviating/aggravating