Lateral Column Lengthening Osteotomies

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KEYWORDS

• Column • Foot • Lateral • Osteotomy

KEY POINTS

- The adult acquired flatfoot deformity requires intimate knowledge of not only the anatomy of the foot, but also of the biomechanical interactions between the joints.
- Lateral column lengthening can be performed in isolation or combined with other procedures to improve foot position and function.
- Both calcaneocuboid distraction arthrodesis and Evans-type procedures can be used successfully to lengthen the lateral column.

In the development of the adult acquired pes planovalgus foot deformity, the lateral column becomes relatively shortened in relation to the medial column. This gives the clinical appearance of an abduction deformity of the forefoot at Choparts joint and a hindfoot calcaneovalgus deformity. The Chopart joint is the transitional link between the hindfoot and the forefoot and it serves to compensate the forefoot for the hindfoot position. In the weight-bearing position, the internal rotation of the tibia imposes an eversion force on the subtalar joint. This subtalar position ensures the Choparts joints are essentially co-linear and are free to make compensatory adjustments on weight-bearing. During heel-rise and toe-off, lateral rotation of the tibia affects the subtalar joint to invert shifting the Achilles tendon medially initiated by the tibialis posterior muscle. This produces a rigid lever through Choparts joint and restricts motion at these joints because the joint axes are no longer parallel. Any loss of this effect at the subtalar joint results in loss of this rigid lever effect and the subtalar joint remains everted. The Chopart joint does not lock and gradually the effect of this is abduction of the forefoot on a calcaneovalgus deformity with lateral rotation of the navicular on the talus. On plain radiographs, this can be clearly seen with loss of talonavicular

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coverage on the anteroposterior view and loss of medial cuneiform to fifth metatarsal height or a relatively proximal calcaneocuboid joint to the talonavicular joint on the lateral view.

WHAT IS LATERAL COLUMN LENGTHENING?

The lateral column of the foot comprises the anterior facet of the calcaneus, its articulation with the cuboid and the fourth and fifth tarsometatarsal joints. Lateral column lengthening procedures are typically used in patients with a pes planovalgus deformity. Procedures can be carried out at any level of the lateral column, but typically include a medializing calcaneal osteotomy, a distraction calcaneocuboid arthrodesis, or a lengthening osteotomy of the anterior process of the calcaneus. The goals of any or all of these procedures is to treat the patients symptoms by alleviating any discomfort and correct the clinical deformity, which improves foot kinematics during the gait cycle and reduces the likelihood of rapid progression of the disorder with degenerative changes in the hindfoot and midfoot.

CALCANEAL ANTERIOR PROCESS LENGTHENING PROCEDURES

Brief History

It is fascinating to think that the origins of this procedure emanated from a mistake made by a surgeon during surgical correction of a clubfoot. In 1961, Dilwyn Evans published a series of relapsed clubfeet corrections.[1] Part of the surgery was to perform a calcaneocuboid shortening excision arthrodesis. In 2 cases, however, he noticed an overcorrection owing to excessive bone excision, which produced a convex medial border and calcaneovalgus. After attempted corrections with calcaneal osteotomies, he finally deciphered that the shortened lateral column had produced lateral rotation of the navicular on the talus that could not be simply corrected by a mechanical shift of the heel. He, therefore, realized the lateral column needed to be lengthened to medialize the heel, reduce the convexity of the medial border, and somewhat restore the natural equinus of the foot.

"In the normal foot the medial and lateral columns are about equal in length, in talipes equino-varus the lateral column is longer and in calcaneovalgus shorter than the medial column. The suggestion is that in the treatment of both deformities the length of the columns be made equal." This quote is an extract from Evans last paper entitled "Calcaneo-valgus deformity" published in August 1975.[2] Sadly, he passed away in November 1974 at the age of 64, never to witness arguably his most famous legacy.

Evolution

Before the introduction of the lateral column lengthening, treatment of the flatfoot deformity usually involved arthrodesis procedures. In Evans 1975 article, it is clear he wanted to preserve the calcaneocuboid joint. His original technique was first performed in 1959 for overcorrected talipes equinovarus, calcaneovalgus after polio, rigid flatfoot, and idiopathic calcaneovalgus. After his surgery on overcorrected club feet, he stated:

> Perhaps the most interesting single point that has emerged from this series of cases is the conversion of varus into valgus. It then became obvious that excessive shortening of the lateral border of the foot had produced an excessive lateral rotation of the navicular on the head of the talus and that the remedy was to undo the calcaneocuboid fusion and to lengthen the lateral border of the foot by inserting a wedge graft. This was tried and it produced, in varying degree,