

**a**pert syndrome includes a wide range of physical anomalies involving the head, face, hands and feet. While a lot of attention has been directed at treating the craniofacial problems and syndactyly (fusion of the fingers) of these children, very little has been written or done about the anomalies of their lower limbs, especially their feet.

## Fusion of toes

The most obvious problem in the feet of children with Apert syndrome is fusion of their toes. This is similar to what is seen in their fingers, with three types of feet identified. In Type I, the second through fourth toes are fused, with the big and little toes separate; in Type II, toes two through five are fused; while in Type III, all five toes are joined. There also are a few studies of X-rays and three-dimensional CT studies which show abnormalities of the other bones of the foot as well.

## Foot size and shape

Children with Apert syndrome have small feet which are reduced more in length than width. As they grow, growth of their feet is below average in both length and width.

In addition to their small size, Apert feet are misshaped. Some children have flat feet, with or without a prominent bunion at the base of the big toe. These bunions are due to an abnormal angle between the toe, which is turned toward the outside of the foot, and the first metatarsal, one of the long bones of the arch of the foot. Other children may have a similar projection on the outside of the foot, between the little toe and the fifth metatarsal.

## Ball of the foot and balance issues

The most common deformity of the foot is found in the ball of the foot, at the base of the toes. When you look at a normal footprint, you can see a large area of the sole which is in contact with the ground, from the large heel, along the side of the arch and across the ball of the foot. In a normal foot, all five bones of the arch touch the ground at the ball. This gives you a solid base to stand and walk on. In most Apert children, one of these bones, usually at the base of the second toe, projects downward more than the others. This produces a visible, heavy callus at the end of the bone. Instead of a broad base of support along the ball of the foot, all of the weight of the body is shifted to this single point. This makes balance much more difficult whether standing or walking and is part of the problem many Apert children have with walking or running.

This change in the foot means that the entire body has to adjust itself to maintain its balance. One of the results of these changes is an increase in the curvature of the lower back. This is known as lumbar lordosis or "swayback."

All of these changes to the foot and the lower body contribute to one of the common problems in Apert syndrome children – finding comfortable footwear that fits. Right now, there is no solution to this problem. Because Apert syndrome is so rare, there are no data right now which might aid in designing orthopedic shoes to adjust for the deformities. Each child's feet are different and need different solutions.