Reduced tibial torsion in congenital clubfoot

CT measurements in 24 patients

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ABSTRACT – We determined leg torsion with CT scans through the femoral condyles and the ankle joints in 24 children (17 boys) with congenital clubfoot. In 16 cases, there was a bilateral clubfoot, in 5 cases it was left-sided and in 3 cases, it was on the right side. These children were compared to 17 healthy boys and 7 girls. The ages of all children ranged between 3 and 12 years.

The average external torsion of the leg in the patients with clubfoot was 20 (15) versus 31 (7) degrees in the healthy children (p = 0.002). This study shows that there are great variations in leg torsion in children with congenital clubfoot and, on average, the external torsion is significantly lower than in healthy subjects.

Adduction of the tarsal and metatarsal bones is a well-recognized feature of congenital clubfoot (Wynne-Davis 1964a, Irani and Sherman 1972). Less is known about the anatomy of the ankle and tibia. Reduced external torsion of the leg has been described as a factor for persistent intoeing (Staheli 1990). However, there is disagreement as to whether there is abnormal leg torsion in congenital clubfoot, and tibial osteotomy in the treatment of these children is a controversial procedure (Napiontek and Nazar 1994). We investigated whether congenital clubfoot is associated with rotational abnormalities of the leg.

Patients and methods

The patient group consisted of 17 boys and 7 girls aged 3–12 years admitted to our hospital due to congenital clubfoot. In 16 cases, the clubfoot was bilateral, resulting in a total of 40. These children were compared to 24 age- and sex-matched healthy subjects selected from a Kindergarten. The parents and the children were given written information about the purpose of the study and scanning procedures, and all parents gave their consent for the examinations. The radiation exposure of one scanogram and tomograms through the knee and ankle joints was accepted by the National Department for Radiation and the Regional Committee for Ethics in Science. The average effective dosage was estimated at < 0.05 mSv.

Toshiba X-peed CT equipment was used. The patients were placed supine with hips and knees fully extended and the thighs and legs horizontal and parallel. After a scanogram, a 5-mm-thick tomogram was obtained through the femoral condyles (Figure 1). This gave a proximal reference line as the tangent to the dorsal aspects of the femoral condyles. A tomogram, just below the articular cartilage of the ankle joint, was selected as the distal reference line, drawn from the center of the lateral malleolus to the center of the medial malleolus. Torsion of the leg was measured as the inclination between the dorsal tangent to the femoral condyles and the distal reference line.

All lines were drawn and measured on the tomograms by the same radiologist. The values on the right and left sides were calculated for each child and averaged in patients with bilateral clubfoot and in the healthy children. This pooling of the data identified the patient (but not the leg) as the unit for analysis. In cases with unilateral clubfoot, only the value of the affected side was used.

Data are expressed as the mean and the dispersion as one standard deviation (SD) of the mean.