MEASURED SPASTICITY AND FUNCTION DO NOT CORRELATE IN CHILDREN WITH CEREBRAL PALSY

David Yngve, MD, Brent Taylor, BS

University of Texas Medical Branch, Galveston, Texas

Purpose: Spasticity is a component of the disability of children with cerebral palsy yet it is difficult to quantify, and difficult to determine the degree to which it impacts function. Our purpose was to measure spasticity in children with idiopathic toe walking and in children with cerebral palsy of different functional levels.

Methods: Spasticity was defined as the difference in range of motion (ROM) when measured awake and under anesthesia. Our assumption was that spasticity is absent under anesthesia, and therefore this difference is a proxy measure. We measured the difference in joint ROM awake and under anesthesia at the hip, knee and ankle in 12 patients with idiopathic toe walking and 128 patients with cerebral palsy of different Gross Motor Functional Classification System (GMFCS) levels in which level I walks independently and level IV uses a wheelchair in the community (GMFCS I: 23, GMFCS II: 32, GMFCS III: 39, GMFCS IV: 34). The first author made all the measurements, which were all done with the same technique, to determine the joint position at the first catch. Hip abduction was measured with the hip flexed 90° and the pelvis level. Popliteal angle was measured with the hip flexed at 90°. Ankle equinus was measured with the knee in extension.

Results: The idiopathic toe walker group showed no difference in ROM between awake and anesthesia states and therefore no increased spasticity. There were differences between the idiopathic toe walker group and the cerebral palsy group that were both clinically significant and statistically significant: hip abduction 17° (p = .0008), popliteal angle 14° (p = .004) and ankle equinus with the knee extended 16° (p = .0002). This demonstrated that there was increased spasticity in the cerebral palsy group. Regression analysis of the GMFCS I, II, III and IV data showed that there were no increases in the measure of spasticity with increasing GMFCS level at the hip or knee. This indicates that the more involved children with less functional ability did not have more spasticity at the hip or knee that could have explained their disability. Only at the ankle was there a small increase in the spasticity measure (5°) for every 1-unit change in GMFCS (p = .0014). Since the ankle is not as critical for function as are the hip and knee, this change is probably not clinically significant.

Conclusions: By this new measure of spasticity, idiopathic toe walkers did not show an increase in spasticity, which agrees with the clinical presentation. In children with cerebral palsy an increase in spasticity was measured at the hip and knee but the amount measured did not increase as the GMFCS level of disability increased.

Significance: Although spasticity is often a prominent finding in children with cerebral palsy, it is not the factor that explains why some children with cerebral palsy have more disability than others.