Recurrence after Femoral Derotation Osteotomy in Ambulatory Youth with Cerebral Palsy

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Purpose: Femoral derotation osteotomy (FDO) has been shown to be an effective short term treatment for in-toeing due to dynamic hip rotation in gait. The purpose of this study was to define persistence and recurrence of hip internal rotation (IR) following FDO in ambulatory children with CP and to evaluate factors that influence outcome.

Methods: Following IRB approval, kinematic and passive range of motion (PROM) variables were retrospectively evaluated in ambulatory children with spastic CP who had a FDO to correct hip IR. Included cases had a pre-op evaluation (Vpre), a short term post-op evaluation (Vshort, 1-3 years post), and a long term post-op evaluation (Vlong, ≥ 5 years post). Persistence was defined at Vshort as hip IR > norm+1SD and lack of improvement by 10˚, recurrence was defined at Vlong as > norm+1 SD and > 10˚ of recurrence compared to Vshort. Age at surgery, gait velocity, gross motor function, muscle spasticity, external tibial torsion (ETT), coronal plane pressure index, hip rotation in stance, and hip PROM midpoint were evaluated as predictors for dynamic and static recurrence using regression analysis.

Results: In 96 limbs (from 63 children) that underwent FDO, average stance hip rotation improved from 14 ± 12˚ (Vpre; age 9 ± 3 years) to 4 ± 12˚ (Vshort; age 11 ± 3 years) and relapsed to 9 ± 15˚ (Vlong; age 16 ± 3 years; p<0.05 Vpre/Vshort/Vlong; Norm -5 ± 7˚). Hip PROM midpoint improved from 23 ± 9˚ (Vpre) to 8 ± 11˚ (Vshort) and relapsed to 14 ± 13˚ (p<0.01 Vpre/Vshort/Vlong; ; Norm 5 ± 6˚). Tibial torsion became progressively external over time; -2 ± 17˚ at Vpre, -10 ± 16˚ at Vshort, and -15 ± 14˚ at Vlong (p<0.05 Vpre/Vshort/Vlong; Norm -3 ± 9˚). When considering individuals, internal hip rotation persisted in 41% (kinematics) and 18% (PROM) of limbs at Vshort. Recurrence was seen in 40% (kinematics) and 39% (PROM) of limbs at Vlong in children that demonstrated improvement at Vshort. Uncorrected ETT, and initial severity of hip midpoint PROM were significant factors associated with recurrence according to regression analysis.

Conclusion/Significance: Although FDO is an accepted form of treatment, persistence and recurrence of internal hip rotation can occur in children with CP. Recurrence is predicted by ETT, and severe preoperative hip internal PROM. Predictors can be used to determine ideal children for surgery and surgical success.