

Proximal Femoral Osteotomy in Children with Cerebral Palsy: What Factors are Associated with Revision?

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Background and Purpose

The purpose of this study was to evaluate mid-term results of proximal femoral varus derotation osteotomy (VDRO) in a large population of children with cerebral palsy (CP) and determine what effect age, Gross Motor Function Classification System Level (GMFCS), surgeon experience and preoperative radiographic features have on the survivorship of this intervention.

Study Design

Retrospective Case Series: Level II Prognostic

Participants & Setting

All children with CP, undergoing a VDRO for hip displacement at a tertiary-level pediatric hospital between January 1994 and December 2007 were included.

Methods

Age, gender, GMFCS, preoperative radiographic parameters, previous hip surgery or Botulinum toxin administration, adjunctive pelvic osteotomy, presence of bilateral surgery at index VDRO and experience of the surgeon were recorded from the medical record. Experienced surgeons performed >30 VDROs in the cohort. Results were analyzed with univariate and multivariate regression analysis for association with need for revision hip surgery. Kaplan-Meier survivorship curves were generated determining time from index surgery to "failure", defined as either the need for subsequent surgical procedures on the hip, not including isolated hardware removal. Revisions were further stratified according to their severity (soft tissue lengthening versus revision osteotomy of the femur/pelvis).



Figure 1a,b. Demographic and surgical composition of the study cohort.

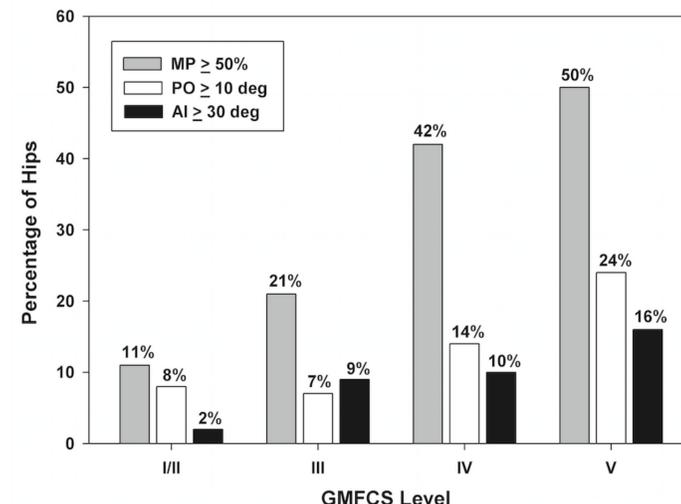


Figure 2. Preoperative radiographic distribution of patients according to GMFCS level.

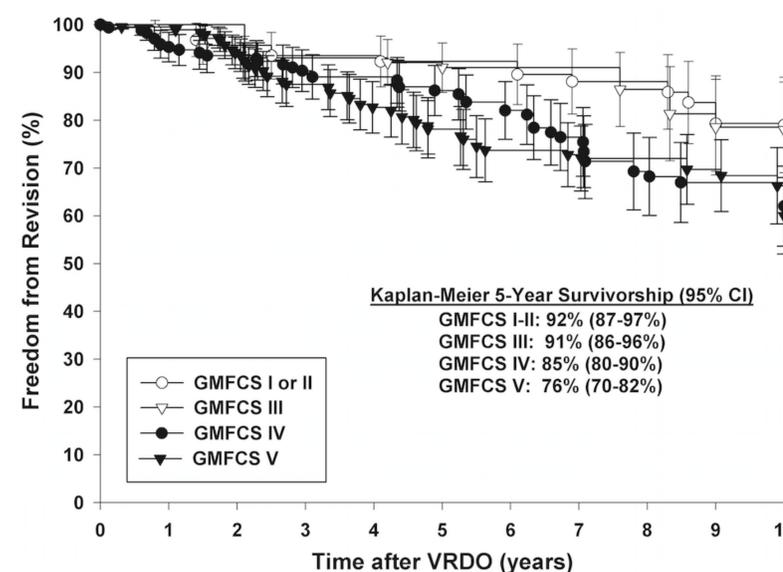


Figure 3. 10 year survivorship analysis according to GMFCS level.

Results

A total of 566 VDROs were performed on 320 children - mean age 8 years (std 3.3yrs) and mean follow up was 8.3 yrs (3-18).

125 (22%) of the hips required revision during the study period

- 76 soft tissue
- 49 bony

Multivariate cox regression analysis confirmed independent predictor for revision

- Age @ surgery (p<0.001)
- GMFCS (p<0.001)
- Surgeon experience (p=0.01)

Total revision rates according to age were:

- 3-6 years (35%)
- 6-12 years (18%)
- >12 years (8%)

5 year survivorship revealed a 92% success rate for GMFCS I/II children compared to 76% success rate for GMFCS V children (p<0.01).

Prior Botox injection, soft tissue surgery, MP>50%, nor the addition of pelvic osteotomy at index VDRO were found to be significant protectors of surgical failure

Discussion

The results of this study demonstrate a high revision rate after VDRO 22% in children with CP. Age, GMFCS level and surgeon experience are strong predictors of surgical success. These results illustrate the challenges with spastic hip subluxation, in that those with the greatest burden of disease require earlier surgery and suffer from the higher revision rates.