Unstable hips in children with cerebral palsy GMFCS 3-5: Does acetabuloplasty make a difference in hip reconstructive surgery?

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Background/Objectives
Uncertainty and controversy exists as to whether and to what degree an acetabuloplasty adds stability in hip reconstructive surgery in children with cerebral palsy and hip instability (1). It has also been argued that acetabular development provides hip stability after varus derotation osteotomy (VDRO) alone over time. Unstable hips can dislocate and/or deformities of the femoral head and the acetabulum can occur, resulting in discomfort, pain and sitting as well as sleeping difficulties.

Study design
This is a retrospective cohort study.

Study Participants
A purposeful sample of 73 hips in 56 children with cerebral palsy, GMFCS 3-5, was taken with defined prerequisites of hip instability, likely to dislocate subsequently if left untreated. These hips were treated either with a VDRO alone or in combination with a Dega acetabuloplasty, defining two groups for comparison. Six children were GMFCS 3, 14 were GMFCS 4 and 36 were GMFCS 5.

Materials and Methods
The study was conducted at The Children’s Hospital at Westmead, Sydney, Australia, from medical records and X-rays, between 2005 and 2013. Hip instability was defined as a subluxed hip grade IV, according to Robin et al. (2), with a Reimers’ migration percentage (MP) > 30%, a broken Shenton’s line > 5 mm and invariable femoral head deformity. The method of hip reconstruction was chosen at the preference of the surgeon and influenced by the child’s health. Outcome measures were MP, acetabular index (AI) andCentre Edge Angle (CEA).

Results
Median age at time of surgery was 10 years (range 3 – 16 yrs). 27 hips underwent VDRO alone and 46 hips had VDRO + Dega osteotomy. Both groups were homogenous with very similar pre-op values for MP, AI and CEA. The median for final follow-up was 46 months.

Migration percentage (MP)
In the VDRO group the pre-op median MP was 63°. It dropped to 28° immediately post-op and increased to 33° at 2 years post-op and 30° at final follow-up (Table 1). In the VDRO + Dega group the pre-op median MP was 60°, immediately post-op 10°, at 2 years post-op 23° and at final follow-up 22°. At 2 years post-op 12 hips (44%) were stable in the VDRO group, 35 (76%) were stable in the VDRO+Dega group. At final follow-up 15 hips (58%) were stable in the VDRO group, 37 hips (80%) were stable in the VDRO+Dega group.

Conclusions
If the hip is unstable, using defined criteria of hip instability, the combined VDRO+Dega procedure has provided a much higher likelihood of long term hip stability than a VDRO of the femur alone, and evidence was strong. This is important because hip instability in persons with cerebral palsy is likely to progress with age, even after skeletal maturity, leading to difficulties with position, hygienic care and pain. Some positive change of the acetabular index over time occurs when the acetabular ring ossifies towards skeletal maturity in both groups, however, this has not provided sufficient hip stability in the VDRO group.

References:

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Table 1: Median value of migration percentage (MP) for both groups, VDRO only and VDRO+Dega, before, immediately after, two years after and at final follow-up. The black line at 30% indicates the limit of hip stability (instability >30%).

Table 2: Median value of the acetabular index in degrees for both groups, VDRO only and VDRO+Dega, before, immediately after, two years after and at final follow-up. The dotted line indicates the limit of a well shaped acetabulum (norm < 15°).

Table 3: Median value of the centre edge angle in degrees for both groups, VDRO only and VDRO+Dega, before, immediately after, two years after and at final follow-up. The CEA should be > 20° in 4-13 year old children, > 25° in children > 14 years (black line).

Figure 1: X-ray ap pelvis with unstable right hip. AI = acetabular index, CEA = centre edge angle

Figure 2: Migration percentage