

To Assess the Effectiveness of Postural Management Programmes In Reducing Hip Dislocation In Children With Bilateral Cerebral Palsy

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Introduction

Hip subluxation/dislocation occurs in 60% of children with cerebral palsy who are not walking at 5 years. It has a debilitating effect on function, pain levels, ability to sit and personal care.

In children with cerebral palsy the hip joint appears to be normal at birth but the effects of delayed motor development and asymmetrical patterns of muscle activity lead to changes in the proximal femoral anatomy and the acetabulum. Lack of ambulation and changes asymmetrical forces across the growth plates result in femoral anteversion & increased femoral neck angle (1-7). Spasticity and shortening of the hip flexors, hip adductors and the medial hamstring muscles around the hip are particularly implicated in the deforming forces

Management has been largely by surgical interventions which include preventative soft tissue, reconstructive bony surgery and less widely used Selective Dorsal Rhizotomy and Intrathecal Baclofen(8-12). Botulinum toxin has a growing role in the management of hip pain. Long term outcomes of surgical intervention are variable and adults with cerebral palsy report ongoing pain in the hip and low back regions. There has been a focus on single hip outcomes in many studies which ignores the child as a whole.

Postural management programmes offer a planned approach encompassing all activities and interventions which impact on an individual's posture and function(13). Within these programmes postural management equipment offers positioning, in lying, sitting and standing to encourage active movement maintain muscle length, control/prevent deformity and increase function. The quality of positioning achieved within the equipment is crucial to its success and needs to maintain a neutral pelvic position in terms of tilt, rotation and obliquity and a neutral hip position. A retrospective study found that provision

of positioning equipment prior to hip subluxation had better outcomes in terms of hip migration compared to surgery (14)

The study aimed to determine whether the early introduction of postural management equipment can reduce levels of hip subluxation at 5 years compared to an historical control group.

Method

The study was a prospective longitudinal cohort design study with a subset of an historical control group who were not walking at 5 years. Forty-nine children with bilateral cerebral palsy, 18 months of age or less were recruited from the South-East of England. Eleven children withdrew from the study due to illness, death and social situations leaving a sample of 38 children.

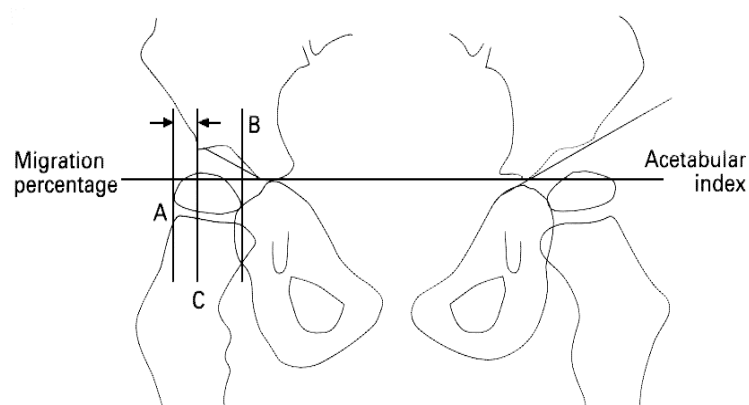
Equipment was prescribed and provided according to clinical need. Children were reviewed at 3 month intervals until they reached the age of 5 years.

Outcome measures: X ray measures of migration percentage at 30 and 60 months (see figure 1);

Hip status was categorised as both hips safe, 1 hip subluxed or both hips subluxed. Subluxation was deemed to occur over 33% percent migration

The Chailey Levels of Ability postural analysis tool for children with severe cerebral palsy and the use of equipment both which items were used and for how long on a daily basis.

Figure 1 Measurement of Hip Migration Percentage



Results

Fifty one children were recruited to the study and 40 have reached the secondary endpoint of 5 years and are included in this analysis. Levels of hip subluxation/dislocation have been compared with the historical control group levels of ability and equipment use have correlated and risk factors of hip

problem defined and tested in this cohort (Scrutton and Baird 1997; Scrutton et al 2001).

The type of cerebral palsy within the group followed the usual patterns with 68.4% of children having spasticity as the predominant feature and 63.2% of children had quadriplegic cerebral palsy.

At 5 years 65% of children had both hips safe, 10% 1 hip safe and 25% both hips subluxed. Children who used the equipment at recommended or moderate levels were significantly more likely to have both hips safe (Kruskall Wallis $p \leq 0.008$). Regression analysis did not detect any one single factor such as type of cerebral palsy, level of ability, or age at entry to study as being more influential on outcomes.

The range of postural management equipment provided at 30 months and 5 years of age is illustrated in Figure 3.

Equipment	Lying, seating & standing support	Lying support & seat	Seat & Standing support	Seat only	Other
30 months	20 (50%)	5(12.5%)	13 (32.5%)	1 (2.5%)	1(2.5%)
5 years	15 (37.5%)	0	15 (37.5%)	3 (7.5%)	7 (17.5%)

The current cohort's finding control group was compared to the historical control's group. In the control group of children who had not walked at 5 years 58% had a "hip problem" which was defined as child having: had hip surgery, been prescribed a hip and spinal orthosis (HASO) and/or a hip migration percentage of > 32%.

In the current group 35% of the children had one or both hips with migration percentages greater than 33%, 2 children (5%) had had hip surgery, no children had used a HASO and 3 children (7.5%) had Botulinum Toxin injections to muscles surrounding the hip.

Scrutton and Baird (1997) documented changes in hip migration from 30 months to 5 years enabling clinicians to identify children likely to have a "hip problem" at 5 years. The current cohort's outcome was compared to this and a weak relationship was found with approximately 50% agreement.

Conclusion

This study has found that the early provision of postural management equipment has a role to play in reducing hip subluxation/dislocation in cerebral palsy. This study has showed a decrease in surgical interventions under the age of 5 years although this may be to some extent a change in orthopaedic practice. Parents of the children involved in the study were made aware of the risk of hip problems and this knowledge this may also have contributed to the improved outcomes. This study has investigated hip outcomes in cerebral palsy only up to the age of 5 years and it must be recognised that there is a continuing risk of hip subluxation into adolescence.

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