

Slightly less than 20 years ago we started our experience with multi-site surgery in children with cerebral palsy. Our first surgery was performed in March 1995. Since then, until December 2010, we performed 477 multisite procedures, mostly in spastic diplegic children, but 40 times in hemiplegic children. We would like to share this experience.

We followed the experience of J. Gage who justifies this type of care because it limits the number of procedures and rehabilitation stays, avoiding the “birthday syndrome”, because it decreases the cost of care, and especially because it allows obtaining better results than before.

Excepting one iliac artery wound sutured without sequelae, we have not had any major complications. No transfusions have been required (femoral osteotomies were performed with a Esmach band at the proximal part of the limb supported on an iliac pin). The only complications leading to supplementary surgery were nonunions after femoral and mostly tibial derotation osteotomies only in older adolescents (all healed after new surgery). No child had a worsened functional level.

Our results are similar to those reported in the literature in terms of improved function, GGI, and quality of life. The development of multisite surgery has been accompanied by the development of criteria assessing treatment outcome in these children.

This type of surgery is only possible:

- if a full assessment has been applied, particularly with gait analysis, and if the indication is discussed by a multidisciplinary team;
- if the operation can be practiced with a double team (in the diplegic patient);
- if joint mobilization is started within days after surgery;
- and if weight bearing is started very early (2 weeks).

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CO04-002-e

Validity and reliability of radiological methods assessing the proximal hip geometry in children with cerebral palsy: A systematic review

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Keywords: Cerebral palsy; Children; Radiological measures; Validity; Reproducibility; Hip migration; Acetabular dysplasia; Neck-shaft angle; Femoral anteversion

Introduction.– Numerous radiological methods with various levels of validity are available to assess the specific hip deformities of children with cerebral palsy. The aim of this systematic review was to assess the current in vivo validity, reliability and limits of use of the different radiological methods measuring the proximal hip geometry in this population.

Methods.– A data base search was conducted using relevant key words and inclusion/exclusion criteria in seven databases. The quality assessment was rated using a customized scale that evaluates both the quality of the article and the metrological strength of the evaluated method (Q = score/100).

Results.– Eighteen articles with a mean Q-score of 65/100 (SD 15) met the inclusion criteria. The migration percentage using X-ray, evaluated in seven studies (mean Q = 68.42), showed an excellent reliability and concurrent validity with a 3D CT scan measure of hip migration. Thresholds for a true change were between 8.3% and 22%.

Regarding acetabular dysplasia, the acetabular index (X-ray), evaluated in three studies (Mean Q = 63.5). Despite only moderate validity with a measure carried out in 3D CT scanner, the acetabular index had a good to excellent reliability. Thresholds for a true change were between 3.7° and 5.9°. 3D CT scan indexes, evaluated in five studies (mean Q = 74) had greater reliability.

The measure of neck shaft angle using X-rays, evaluated in three studies (mean Q = 74.6) showed excellent concurrent validity with measures from 3D CT reformatted slices and excellent reliability. Ninety percent of the measures had been reported to be within 10° of error.

Regarding femoral anteversion, one study (Q score = 89) found excellent correlation between the 2D CT scan and trochanteric prominence angle test and excellent reliability. Two others showed less evidence for the use of other CT scan or ultrasound based techniques.

Discussion.– Once the limits of use are recognized, hip migration, acetabular dysplasia and neck-shaft angle can be measured using X-ray. If needed, 3D CT scan can also be used reliably for acetabular dysplasia. Further evidence is required regarding the validity of 3D CT-scan and non-irradiative methods as ultrasounds and MRI.

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Influence of pelvic kinematics on lower limb rotational deviations during gait

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Keywords: Cerebral palsy; Spastic diplegia; Lower limb rotational deviation; Pelvic kinematics

Introduction.– Lack of normalization of foot progression angle after correction of lower limb torsional troubles raised the question about the influence of pelvic rotation on lower limb rotation during gait. Pelvic rotation abnormalities are difficult to predict by physical examination. The aim of the study was to explore the influence of pelvic kinematics on foot progression angle deviations.

Methods and subjects.– We retrospectively reviewed kinematic data of 188 children with spastic diplegia without any previous surgery. Data, recorded at mid stance phase, were: pelvic rotation, hip rotation, ankle rotation and foot progression angle.

Results.– Abnormal pelvic rotation was noticed in 255 of 376 lower limbs (68%). Among 231 patients with internal foot progression angle, internal pelvic rotation was associated to other transverse plan kinematic deviations in 98 cases (42%). For 78 patients who showed external foot progression angle, external pelvic rotation represented a combined cause in 22 cases (28%).

Discussion.– Pelvic rotation is difficult to analyse by means of observational gait analysis alone. This kinematic parameter can represent an isolated cause of abnormal foot progression angle but it is often combined with other transverse plan deviations. A detailed kinematic analysis of interaction between planes is an essential step when making surgical planning, particularly when foot progression angle has to be corrected.

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Lower limb torsional profile in children with spastic diplegia

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Keywords: Spastic diplegia; Children; Lower limb rotational profile

Introduction.– Lower limbs rotational troubles in spastic diplegic CP children are frequent and difficult to identify by physical examination alone. These troubles modified level arms length and they are important to be treated. The aim of the study was to put in evidence patterns of lower limbs rotational troubles on kinematic data.

Material and methods.– Hundred and eighty-eight spastic diplegic CP children, without any previous surgical procedure, were retrospectively reviewed. Kinematic data analysed pelvic, hip and ankle rotation with foot progression angle.