Original Article

Grading of Adductor Spasticity in Cerebral Palsy – A New Approach

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Abstract

Spastic cerebral palsy is the most common form of cerebral palsy. Spasticity in hip adductor causes discomfort, stiffness and difficulties in performing physical activities such as seating, transfers and walking. Grading of hip adductor spasticity is still a challenge in the field of rehabilitation. A simple method to assess hip adductor spasticity and use it as outcome measures of intervention is needed in general clinical practice.

We propose a visual method for grading hip adductor spasticity i.e grade 1= touch at ankle, grade 2 = crossing at ankle and grade 3 = crossing at knee in spastic cerebral palsy children. We followed 60 spastic cerebral palsy children over a period of three months on oral antispastic medication and found it very useful to assess response to drug. Intially hip adductor spasticity of grade 3 was observed in 10 %, grade 2- 8.33%, grade 1- 26.66% and 45% patients had no scissoring. After three months of drug therapy improvement was observed as grade 3 seen in 1 % , grade 2 - 7%, grade 1 - 23.33% and patients with no scissoring rose to 63.3%. These observations show that visual method for hip adductor spasticity is a simple and helpful method for grading response to therapeutic intervention.

Key words: **Cerebral palsy, spasticity, hip adductors.**

Introduction:

Hip adductor spasticity in cerebral palsy (CP) can lead to spastic hip dysplasia, hip subluxation and problems with perineal hygiene[1,2]. In management of hip adductor spasticity, measurement of spasticity is a difficult and unresolved problem, partly due to its complexity and the fact that there are many factors involved. Various assessment scales used are as follows[3]:

- Modified Ashworth scale
- Tardieu scale
- Adductor tone rating scale

Above mentioned scales for spasticity rating require expertise in handling of the child. The velocities needed to elicit spasticity are not fixed and inter-rater variability is possible[4]. During follow-up it may not be possible for the evaluating physician to use the same amount of force to elicit spasticity. This may increase the subjectivity of the grading.

Some scales are also time-consuming. We propose a visual method for grading hip adductor spasticity in spastic cerebral palsy children. Purpose of this study is to assess proposed grading response to oral antispastic medication and convenience with which it can be measured.

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Materials and Methods:

A prospective follow-up study was conducted in 60 spastic CP children of both sexes in the age group of 2-12 years who attended CP clinic in Department of PMR, VMMC and Safdarjang Hospital, New Delhi from May 2010 to December 2011. Baseline demographic and clinical data were recorded for each child including age, weight, spasticity distribution and GMFCS level. Baseline investigations including liver function test and kidney function test were recorded. Children were assessed for hip adductor spasticity by visual method.

Method of assessment:

Hold the child in vertical suspension and observe the position of the legs and scissoring pattern.

Grading is done as follow:

Participants: Sixty cerebral palsy with spastic diplegia children attending C.P. clinic in Department of Physical Medicine and Rehabilitation, Safdarjang Hospital, New Delhi, who fulfilled following criteria were eligible for the study. Children aged 2-12 years with Modified Ashworth's scale score of 1+ or higher in both legs were included. Children already on oral antispastic drugs, history of Botox injection in previous six months, contracture in lower limbs and orthopaedic procedure performed in lower limbs were excluded.

Treatment interventions: Patients were given Baclofen 2.5mg t.i.d in children <8 years and 5mg t.i.d. in children >8 years with weekly increment of 5 mg to a maximum of 40 mg/day in former and 60 mg/day in latter after taking informed written consent from their parents/guardians[5]. Follow-up was done at one and three months for grading of scissoring to assess hip adductor spasticity.

Statistical analysis: Demographic and clinical information of the subjects were maintained on the excel software. The analysis was done on MS excel as well as SPSS version 15. Prior to analysis all the entries were double checked for any error.

Results:

Demographic profile (n=60) (Table 1). Maximum children (41.66%) were in 2-4 years age group. Male preponderance with a sex ratio of 2:1 (male: female) was observed.

Grade of scissoring (n=60) (Table 2 & Figs 1-3). Pre-treatment 45% (27/60) of patients had no scissoring, 26.66% (16/60) were of grade 1, 18.33% (11/60) were of grade 2 and 10% (6/360) were of grade 3.

At end of one month, 51.66% (31/60) of patients had no scissoring, 15 (25%) were found to be grade 1, 11 patients (18.33%) had grade 2 and 3 patients (5%) was found in grade 3.

At the end of 3 months 38 patients (63.33%) were found to have no scissoring, 14 (23.33%) had grade 1 and 7 (11.66%) had grade 2 scissoring and 1 patient (1.6%) had grade 3.

Improvement in grade of scissoring at end of 1 and 3 months of therapy (n=60) (Table 3): At the end of 1 month out of 16 patients with grade 1, 4 had no scissoring. Out of 11 patients with grade 2 only 7 had similar grade

Fig 1– *Touching at Ankles*

Fig 2– *Crossing at Ankles*

Fig 3– *Crossing at Knees*

after one month, 3 out of 6 patients with grade 3 improved to grade 2 after one month.

At the end of 3 months of therapy, out of 16 patients with grade 1, 11 patients improved to no scissoring, 9 out of 11 patients with grade 2 improved to grade 1 and out of 6 patients with grade 3, 4 improved to grade 2 and 1 to grade 1.

Discussion:

Study population showed majority children in 2-4 years age group with a male preponderance with a sex ratio of 2:1 (M:F). Hip adductor spasticity is great hindrance in rehabilitation of spastic cerebral palsy children as it interferes in daily handling of child, perineal hygiene and achieving ambulation goal[1,2]. Current scales for spasticity require expertise and skill in handling of the child. The velocities needed to elicit spasticity in modified Ashworth's scale, Tardieu scale and adductor tone rating are not fixed and inter-rater variability is possible. During follow-up it may not be possible for the evaluating physician to use the same amount of force to elicit spasticity. This may increase the subjectivity of the grading. Some scales are also time-consuming. Baclofen is commonly used antispastic drug for managing spasticity. Evaluation of drug effects in patients suffering from muscle spasticity is difficult and must take into account many different factors. Assessment scales for grading of scissoring with minimum subjectivity factor has not been reported in literature so a useful criteria has been evolved in this study. After three months of baclofen therapy reduction in grade of scissoring was seen as intially 55% of patients had scissoring which was reduced to 36.66% after three months. Reduction achieved was seen both in grade of scissoring and number of patients with scissoring. There was steady and significant reduction in scissoring.

Results with baclofen are similar to Milla[6] who in a double blind cross over study of 20 children with spastic cerebral palsy observed that patients on baclofen performed significantly better than placebo in reduction of spasticity and in allowing both active and passive limb movements. Notable improvement was observed in scissoring. Sheinberg *et al*[7] in a double-blind, randomised cross-over pilot study of oral baclofen *versus* placebo on fifteen children with mean age 7. 4 years (SD = 2.7 years) and spastic quadriplegia (gross motor function classification system level IV or V) found that children scored significantly better on the goal attainment scale with baclofen compared with placebo.

Grading of adductor spasticity by visual approach provides a relatively easy and quick method of grading adductor spasticity and can be used to assess interventions to decrease spasticity including therapeutic response of oral antispastic drugs.

Conclusions:

Grading of adductor spasticity by visual approach is easy to perform, less time consuming, has less chances of

Table 1: *Age Distribution (n= 60)*

Age (years)	Total
2-4	25 (41.66%)
4-6	18 (30%)
6-12	17 (28.33%)
Total	60

Table 2: *Grade of Scissoring (n= 60) at Pre-treatment, One Month and Three Months*

Grade of scissoring	No scissoring	Grade 1	Grade 2	Grade 3	Total
Pre-treatment	27 (45%)	16 (26.66%)	11 (18.33%)	6 (10%)	60
At 1 month	31(51.66%)	15 (25%)	11 (18.33%)	3 (5%)	60
At 3 months	38 (63.33%)	14 (23.33%)	7 (11.66%)	1 (1.6%)	60

Grades of scissoring: *Grade 1 = Touch at ankle; Grade 2 = Crossing at ankle; Grade 3 = Crossing at knee*

Table 3: *Improvement in Grade of Scissoring at End of One and Three Months of Therapy*

Grade of scissoring	No of patients (Pre-treatment)	Grade of scissoring at end of 1 and 3 months of baclofen							
		No scissoring		Grade 1		Grade 2		Grade 3	
		At 1 mo	At 3 mo	At 1 mo	At 3 mo	At 1 mo	At 3 mo	At 1 mo	At 3 mo
Grade 1	16	4	11	12	5	0	0	0	0
Grade 2	11	0	0	4	9	7	2	0	0
Grade 3	6	0	0	0	1	3	4	3	1

Grades of scissoring: *Grade 1=Touch at ankle; Grade 2=Crossing at ankle; Grade 3=Crossing at knee; no=Months*

intra-and inter-observer variability. Also it requires less handling and disturbance to the child and can help in grading response to therapeutic interventions. It eliminates the elements of voluntary tightening commonly observed in handling which can interfere with spasticity assessment.

Hip adductor spasticity is common in cerebral palsy and baclofen can be used as effective antispastic agent. The present study shows that grading of hip adductor spasticity by visual approach is a simple, useful and quick method of assessing the problem and its management.

Limitation of study: This grading assessment can only be used for children who can be held in vertical suspension.

References:

1. Deleplanque B, Lagueny A, Flurin V, Arnaud C, Pedespan JM, Fontan D, *et al*. Botulinum toxin in the management of spastic hip adductors in non-ambulatory cerebral palsy children. *Rev Chir Orthop Reparatrice Appar Mot* 2002; **88:** 279-85.
2. Mall V, Heinen F, Siebel A, Bertram C, Hafkemeyer U, Wissel J, *et al*. Treatment of adductor spasticity with BTX-A in children with CP: a randomized, double-blind, placebo- controlled study. *Dev Med Child Neurol* 2000; **48:** 10-3.
3. Schottes VAB, Becher JG, Beelon A, Lankhorst GJ. Clinical assessment of spasticity in children with cerebral palsy: a critical review of available instruments. *Dev Med Child Neurol* 2006; **48:** 64-73.
4. Bohannon RW, Smith MB. Interrater reliability of a Modified Ashworth scale of muscle spasticity. *Phys Ther* 1987; **67:** 206-7.
5. Edgar TS. Oral pharmacotherapy of childhood movement Disorder. *J Child Neurol* 2003; **18:** 40-9.
6. Milla PJ. A controlled trial of baclofen in children with cerebral palsy. *J Int Med Res* 1977; **5:** 398-405.
7. Scheinberg A, Hall K, Lam LT, Flaherty SO. Oral baclofen in children with cerebral palsy: a double blind cross over pilot study. *J Paediatr Child Health* 2006; **42:** 715-20.