

# **Early Surgical Intervention to Facilitate Ambulatory Potential in the Rehabilitation of Spastic Diplegics**

**Dr. R.N. Mohanty**, M.S. (Ortho.), Assitant Professor and **Dr. B. Ramesh Avadhani**, Director  
National Institute of Rehabilitation Training and Research, Bairoi, Cuttack.

## **Abstract**

With the development of Intensive neonatal Care, the Spastic Diplegia associated with Prematurity has become the most common type of Cerebral Palsy. Spastic Diplegia constitutes most common type of Cerebral Palsy. The efficacy of treatment for Improvement must be analyzed according to the prognosis of the motor disorder. Hemiplegics generally become free ambulators, whereas Quadriplegics can hardly walk. More than 50% of Diplegics can be expected to walk freely and the remainder will become crutch ambulators or will not walk at all. Although the severity of brain damage determines the prognosis of locomotion, the developmental potential and plasticity of the brain, presents the possibility of Improvement in locomotor function by systematic and aggressive treatment. Aggressive physical and rehabilitation therapy and selected rehabilitation surgery for correction of deformities and contractures of lower limbs is particularly effective in whom brain damage is moderate. Few have reported the effectiveness of surgical Treatment on locomotor function.

## **Materials & Methods**

For the present study 56 patients out of 315 Spastic Diplegia were selected, who received systematic treatment for one year and could be followed upto 3 years. The age range was from 1 year to 18 years. The initial treatment was Physical Therapy including neurodevelopmental therapy upto 3 years. They were given home exercises programme and after every 2 months they were reviewed. They were encouraged crutch walking (who were wheel chair bound) by the age of five years.

Surgical consideration was taken up to improve the gait and pattern. Surgery was done at the age of minimum 4 years when a matured gait pattern gets established. usually the patients have physical therapy long enough for operative indication to become clear.

---

*Address for correspondence: Dr. R.N. Mohanty Asst. Prof. NIRTAR Bairoi. Cuttack-753010. Orissa Tel/Fax-0672-455552*

---

Different Surgical procedures were carried out according to the following indications.

1. When abduction of each hip was less than 30 degrees, abductor longus Fractional Lengthening + Ant. branch obturator neurectomy was done.
2. For fixed Flexion contracture of hip more than 20 degrees, Fractional Lengthening of Iliopsoas was done.
3. Popliteal Angle of more than 25 degrees - Fractional Lengthening of Hamstrings was done.
4. For tight T.A. - Fractional Lengthening of Tendo Achillis was done.
5. For Dynamic varus deformity of Foot in equinus - split Transfer of Tibialis post to peroni was carried out.
6. When Internally rotated knee-internal hamstring to lateral side was performed.
7. Rectus Femoris Tightness - Rectus Femoris to sartorius was performed.

The deformities were corrected in a single sitting as far as possible. This practice was followed because any residual deformity in one joint might cause a new deformity or recurrence of old deformity. The Physical Therapy started on 5th post-operative day when pain subsides. The Physical Therapy included standing balance, practising SLR and walking in parallel Bar or with crutches. They required this vigorous therapy from 3 months to six months. Parents were taught Home exercises programmes.

The results were evaluated according to the amount of improvement in joint deformities, malalignment of lower limbs and locomotor function. Walking Function was divided into three groups. They are :

1. Free Ambulators
2. Crutch Ambulators
3. Non ambulators.

## Results

At the follow up examination 33 out of 56 patients were free ambulators, 20 were crutch ambulators and 3 were non ambulators. It is shown in Table - 1.

**TABLE - 1**

<i>Group</i>	<i>Results with no. of patients</i>		
Gr-I	Free Ambulators	-	33
Gr-II	Crutch Ambulators	-	20
Gr-III	Non Ambulators	-	03
	Total	-	56

The group-I patients had reported early and received rehabilitation therapy early. Surgery was performed at the age of 4 to 5 years. 28 patients out of 33 in group-I became free ambulators before six years. The other 5 became free ambulators at the age of 9 years. The average age was 3 to 8

years when they started walking. The age at achievement of free ambulation (Group-I) is shown in the Table-2.

**TABLE - 2**

<i>Achievement of Free Ambulation in years</i>	<i>No. of patients</i>
1 year	0
2 years	8
3 years	6
4 years	7
5 years	4
6 years	0
7 years	1
8 years	2
9 years	5
Total	33

The surgical procedures were performed to improve the GAIT pattern and make them free ambulators. Different surgical procedures are shown in Table-3.

**TABLE - 3**

Surgical procedures in 33 children in Group-I

<i>Surgical procedures</i>	<i>Bilateral</i>	<i>Unilateral</i>
F/L. of Iliopsoas	04	2
Adductors long. Tenotomy + Ant. Branch obturator neurectomy	20	2
F/L of Hamstrings	30	1
F/L of Tendo-Achillis	29	1
Split transfer of Tibialis post	03	2
Internal Hamstring to lateral side	-	2
Rectus femoris to Sartorius	02	1

In Group-I most common surgeries were F/ L. of adductor longus + Ant. Branch obturator neurectomy coupled with fractional lengthening of hamstrings and tendo-achillis. Relatively few cases required Iliopsoas release. Other surgeries were few.

In Group-II patients treatment began at late age. Average time of reporting was 5 years. After systematic rehabilitation therapy for a long period, surgery was performed at an average age of 6 years. 18 of 20 patients of crutch ambulators had rehabilitation surgeries performed either before or after gaining ability to walk with crutches.

2 out of 20 patients gained ability to walk with crutches without any prior surgical intervention. Their treatment started earlier. These two however needed surgical correction for deformities.

The surgical procedures needed in Group-III are same as Group-I only difference being more no. of hip flexion contractures were released by fractional lengthening of Iliopsoas.

In Group-III, 3 children would not even walk with crutches. They practice with walkers and wheel chair bound. They are mainly having severe spasticity coupled with mental retardation. Nonetheless, their sitting posture has improved there by facilitating Toiletting. Their average age of starting treatment was 7 years.

## **Discussion :**

Reports have stated that 70-79% of spastic Diplegia become free ambulators whether they have physiotherapy or not (Beals, Bleck). In present series free ambulators, Crutch ambulators and non ambulators were 59%, 35.1% and 5.9% respectively. Because the patients studies were not homogeneous in their degree of brain involvement and at the age they started their first treatment, it is difficult to use ambulatory status to compare the results of treatment. For example children who began treatment at one year had severe spasticity, hence early diagnosis. A child who was seen at 2 years and after wards had less spasticity and some gait abnormality during walking.

Whereas Bleck (1975) reported that most patients attained ambulation before 4 years. Beals (1966) reported this age to be six years. In present

authors study five children started walking after 9 years.

These children started their treatment at average 4.5 years. They could become crutch ambulators around 6.5 years and become ambulatory after hamstring and Gastrocnemius lengthening between ages 6 to 9 years.

Three children who were non ambulators benefitted from fractional lengthening of Iliopsoas and Adductors that their position of sitting and Toiletting were improved. They are severely mentally retarded patients.

The effect of Intensive Physical Therapy was that surgery for hip flexion contracture was minimal. However, it had less effect on hamstrings contracture.

The 3 years follow up study by authors is much longer than in other reports such as Palmer (6 months) & six weeks study by Herndon et. al. Despite this follow-up average age of the patient studied are insufficient to comment upon the adolescent deterioration of motor functions or recurrence of deformities which is a possibility till the growth is completed. We have not yet encountered recurrence of deformities, though the time period might be short or they all are extreme good at home exercises programme.

Therefore, additional long term studies are needed.

## **Conclusions :**

- 5 children became free ambulators after the age of 9 years due to surgical intervention.
- Physical Therapy only managed to prevent hip flexion contracture to some extent.
- Most children with spastic diplegia who have intensive physical therapy combined with adjuvant corrective surgery before the age of 9 years can acquire ambulatory function.
- Early Surgical Intervention along with Physical Therapy holds promises for the spastic diplegia.

## References :

1. Baker L.D - A rational approach to the surgical needs of Cerebral Palsied patients - J.B.J.S. 38A - 313, 1956.
2. Beals R.K - Spastic Paraplegia and Diplegia - An evaluation of non surgical and surgical factors influencing ambulation JBJS-48A-827, 1966.
3. Bleck E.E. Locomotor prognosis in cerebral Palsy Developmental Medicine Child Neurology 17:18, 1975.
4. Bleck E.E. Spastic Diplegia Orthopedic management in C.P. in Bleck E.E. (ed) : Clinics in Dev. Med. No. 99 J.B. Lipincott 1987 P.282.
5. Bobath K - The treatment of Cerebral Palsy 4 Neurophysiological basis for treatment of Cerebral Palsy. In Bobath (Ed) clinics in Dev. Medicine No. 75 J.B. Lipincott 1980 P.77.
6. Green W.T. and McDermott : L.J. Operative treatment of Cerebral Palsy of Spastic type JAMA 118:434. 1942.
7. Herndon, W.A. et al : Effects of neurodevelopmental treatment on movement patterns of children with Cerebral Palsy. J. of Paed. Ortho. 7:395, 1987.
8. Renshaw Thomas S, Green Neil. Griffin Paul P. Root Leon, Cerebral Palsy : Orthopaedic Management - Instructional course lecture JBJS 77-A-1590, 1995.