Management of Spastic Cerebral Palsy due to Wallerian Degeneration through Majja Kshira Basti – A Case Study

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Abstract

Introduction:
Cerebral palsy (CP) is a group of permanent movement disorders that appear in early childhood. Wallerian degeneration is one of the major pathology in spastic cerebral palsy. Wallerian degeneration is a process that results when a nerve fiber is cut or crushed, in which the part of the axon separated from the neuron's cell body degenerates distal to the injury. Wallerian degeneration occurs after axonal injury in both the peripheral nervous system (PNS) and central nervous system (CNS Cerebral palsy (CP) is the leading cause of childhood disability affecting function and development. It occurs in about 2.1 per 1,000 live births. Cerebral palsy is caused by abnormal development or damage to the parts of the brain that control movement, balance, and posture. As it is a multi-factorial disease with clinical features of a wide variation, it cannot be correlated with any single disease or condition in Ayurveda. According to Vāgbhaṭa, it can be classified in the disease categories of sahaja (hereditary) and garbhaja (congenital) type of diseases. It can be taken as Vata Vyādhi as far as its etiology and symptomatology are concerned.

Aim: To assess the effect of majja kshira vasti in the management of CP due to cerebral atrophy.

Materials and Methods: A 4-year-old male child with spastic type of CP due to cerebral atrophy because of Wallerian degeneration came to OPD of GAC, Hyderabad. Patient was treated with abhyanga followed by sarvanga swedana and then with majja kshira vasti for 10 days. The same course of treatment has been repeated for 3 times with an interval of 15 days. Results of treatment were assessed with anthropometrical measurement, Modified Ashworth Scale, muscle power grading along with motor and sensory symptoms.

Result: The above treatment protocol of Ayurveda shows good result in patient especially by improving growth and development, reducing spasticity of right upper limb and muscle spasm with an overall 40-50 % improvement in the symptoms of the patient.

Conclusion: Multisystem approach is needed to improve the condition of the patient. Panchakarma along with internal medication should be given to improve all the facets of spastic CP. Basti acts by their own mode of action and can be used freely for such disease conditions.
Keywords Cerebral Palsy, Wallerian Degeneration, Majja Kshira Basti, Panchakarma in Pediatric
INTRODUCTION

Cerebral palsy (CP) is the leading cause of childhood disability affecting function and development. CP is defined as a non-progressive neuro motor disorder of cerebral origin. Cerebral palsy (CP) is a group of permanent movement disorders that appear in early childhood. Signs and symptoms vary between people. Often, symptoms include poor coordination, stiff muscles, weak muscles, and tremors. CP is classified into four types viz., spastic, ataxic, dyskinetic, and mixed. Spastic CP accounts for a major portion of CP with incidence between 70% and 80%. Wallerian degeneration is a process that results when a nerve fibre is cut or crushed, in which the part of the axon separated from the neuron's cell body degenerates distal to the injury. Wallerian degeneration occurs after axonal injury in both the peripheral nervous system and central nervous system. In the peripheral nervous system, regrowth tends to be more rapid than in the central nervous system.

Population-based studies from around the world report prevalence estimates of CP ranging from 1.5 to more than 4 per 1,000 live births. Of the many types and subtypes of CP, none has any known “cure.” Autologous stem cell activation treatment to expand the blood vessels and nourish the neurons, strengthening of body's immune system, stem cell transplantation procedure, Botulinum toxin type A injection, baclofen intrathecal injection, orthotic devices such as ankle-foot orthoses, hyperbaric oxygen therapy, are the newer advancements being tried out in the management of CP.

There is no such correlation available in Ayurvedic classics with CP, but there are many conditions and some causative factors linked to etiopathology for such type of disease condition described in many chapters in different texts. Contributory factors like inappropriate ṛitu, kṣhetra, ambu and bīja, dauhṛdāvananana (neglect of urges of pregnant women), presence of garbhopaghātakarabhāva (substances which can cause defects or death of foetus), and improper Garbhiniṇi-paricaryā (antenatal regimen) may have undesirable effects on the foetus hampering its normal growth and development consequently leading to many diseases, deformities, and even death. In Ayurveda it can be described as Shiromarmaghat janya vata vyadhi which may manifest as many conditions such as Ekanga Vata, Ardhanga Vata, etc.
CASE STUDY
Name: XYZ
Age: 3.5 years
Sex: Male
Religion: Hindu
Socioeconomic status: Middle class.

Chief Complaints
- Delayed milestones.
- Stiffness in limbs esp. in right upper limb.
- Loss of movement in right upper limb.
- Unable to walk without support.
- Weakness in right side of body.
- Increased tone in right side of body.
- Slurred speech.
- Short term memory and impaired new learning abilities.

History of Present Illness:
Patient was delivered by lower segment caesarean section (LSCS) at full term and did not cry soon after birth and also suffered from birth asphyxia and neonatal jaundice. Due to all these clinical complications, the child could not achieve normal growth and development. Spasticity and restriction of movements in right upper limb with delayed milestones became apparent after the age of 5 months.

History of Past Illness
Birth asphyxia, Neonatal jaundice

Treatment History
The child was being given tablet baclofen (as a muscle relaxant). He was undergoing physiotherapy since 1 year

Family History
No family history and consanguinity found.

Birth History
Antenatal: Normal
Natal: Full term LSCS (due to breech presentation and primiparity of mother) was done.

Baby did not cry soon after birth. Birth weight was 2.5 kg.
Postnatal: Birth asphyxia, neonatal jaundice.

History of Immunization
Proper for age.

Milestones History:

<table>
<thead>
<tr>
<th>Milestones</th>
<th>Attained age</th>
<th>Right age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gross Motor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck holding</td>
<td>3rd month</td>
<td>3rd month</td>
</tr>
<tr>
<td>Sitting with</td>
<td>8th month</td>
<td>5th month</td>
</tr>
<tr>
<td>support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing with</td>
<td>14th month</td>
<td>9th month</td>
</tr>
<tr>
<td>support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pronouncing mono-syllabus</td>
<td>12th month</td>
<td>6th month</td>
</tr>
<tr>
<td>Pronouncing bi-syllabus</td>
<td>14th month</td>
<td>9th month</td>
</tr>
</tbody>
</table>

Examination
- Vitals were normal.
Cardiovascular system, respiratory system and per abdomen examinations had shown no deformity.

Prakṛiti (constitution) was Vātādhikakapha.

Aṣṭavidhaparīkṣā:

- Nāḍi (pulse)- Vātādhikatridoṣaja.
- Mūtra (urine). Frequency and color = Normal.
- Mala (stool) – Constipated
- Jihvā (Tongue)- Sāma (coated suggestive of improper digestion)
- Śabda (speech)- Sluggish, unable to speak sentences
- Sparśa (touch)- hard and dry (due to hypertonia and spasticity).
- Dṛik (eyes) – Normal
- Akṛiti (appearance)- lean (due to malnourishment).

Central nervous system examination

- Hypertonia (spasticity) and contractures at elbow and wrist joint.
- Muscle power –
  
<table>
<thead>
<tr>
<th>Upper limb</th>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lower limb</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

- Sensory system was intact, and no abnormality found.
- Cranial nerve examination = Normal

- Hyperreflexia was present, suggestive of upper motor neuron disease (which is the hallmark of CP).
- Babinski sign= positive.

Table 2 Examination findings

<table>
<thead>
<tr>
<th>Motor examination</th>
<th>Right limb</th>
<th></th>
<th>Left limb</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Upper</td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>1. Muscle bulk</td>
<td>Wasting present</td>
<td>Wasting present</td>
<td>Normal</td>
</tr>
<tr>
<td>2. Muscle power</td>
<td>Grade 1</td>
<td>Grade 3</td>
<td>Grade 4</td>
</tr>
<tr>
<td>3. Muscle tone</td>
<td>Hypertonic</td>
<td>Hypertonic</td>
<td>Normal</td>
</tr>
<tr>
<td>4. Deep tendon reflex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biceps</td>
<td>Exaggerated</td>
<td>Exaggerated</td>
<td>Normal</td>
</tr>
<tr>
<td>Triceps</td>
<td>Exaggerated</td>
<td>Exaggerated</td>
<td>Normal</td>
</tr>
<tr>
<td>Knee</td>
<td>Exaggerated</td>
<td>Exaggerated</td>
<td>Normal</td>
</tr>
<tr>
<td>Ankle</td>
<td>Exaggerated</td>
<td>Exaggerated</td>
<td>Normal</td>
</tr>
</tbody>
</table>

Sensory examination

- Touch
  - Normal

- Pain
  - Normal

- Temperature
  - Normal

Co-ordination test

- Finger nose test
  - Normal

Involuntary movements

- Absent

MRI (T2) findings-

- Loss of volume of entire left cerebral hemisphere with prominence of ipsilateral CSF spaces
• Loss of volume of left side of brain stem due to Wallerian degeneration.
• Gliosis in left perisylvian cortex

**Differential diagnosis**
- Spastic CP,
- Demyelinating (degenerative) disease of central nervous system (CNS),
- Sequel of postnatal hypoxia.

**Diagnosis**
Monoplegic spastic CP” as a sequel of cerebral atrophy due to Wallerian degeneration.

**Treatment Plan**- The total duration of treatment was of 2 months in which mainly the Vata Shamaka Panchakarma therapy along with oral drug was given.

A) Treatment in 1<sup>st</sup> sitting (for 10 days) -
1. Sarvanga Abhyanga – Bala Ashwagandha Taila<sup>12</sup> for 20 mins.
2. Sarvanga Mridu Nadi Swedana – Dashmoola Kwatha for 5-7 mins
3. Matra Basti - Majja Kshira Basti

**Table 3** BT-AT comparison

<table>
<thead>
<tr>
<th>Before Treatment</th>
<th>After 1&lt;sup&gt;st&lt;/sup&gt; sitting</th>
<th>After 2&lt;sup&gt;nd&lt;/sup&gt; sitting</th>
<th>After 3&lt;sup&gt;rd&lt;/sup&gt; sitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to walk</td>
<td>Able to walk few steps</td>
<td>Able to walk 5-8 steps</td>
<td>Able to walk without</td>
</tr>
<tr>
<td>Support</td>
<td>without support</td>
<td>without support</td>
<td>support</td>
</tr>
<tr>
<td>CNS Examination</td>
<td>Before Treatment</td>
<td>After 1&lt;sup&gt;st&lt;/sup&gt; sitting</td>
<td>After 1&lt;sup&gt;st&lt;/sup&gt; sitting</td>
</tr>
<tr>
<td>Nutrition of The</td>
<td>Right Atrophy</td>
<td>Slightly improved</td>
<td>Improved</td>
</tr>
<tr>
<td>Muscle</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B) Oral medicine – Given to patient between 2 Panchakarma therapy sittings for a period of 1 month
- Syrup Shankpushpi - 10 ml. BD
- Ashtanga Ghrita - ½ tsp BD
- Kumara Kalyana Rasa - 1 BD

Treatment in 2<sup>nd</sup> sitting (for 10 days) – The treatment which was given during 1<sup>st</sup> sitting was repeated.

C) Treatment in 3<sup>rd</sup> sitting (for 10 days) – The treatment which was given during 1<sup>st</sup> sitting was repeated.

**RESULTS**

**BT-AT Comparison** – Such 3 sittings of 10 days each are given to the patient at interval of 15 days. After 2 months of treatment the improvement in the signs and symptoms of the patient is shown in the table.
Table 4 BT AT comparison of anthropometric parameters & scales related to CP

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Parameter</th>
<th>BT</th>
<th>AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Weight (in kg)</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Height (in cm)</td>
<td>82</td>
<td>84</td>
</tr>
<tr>
<td>3.</td>
<td>Head Circumference</td>
<td>41</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>(in cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Chest Circumference</td>
<td>50</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>(in cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Modified Ashworth Scale</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>6.</td>
<td>Spasm Scale</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>7.</td>
<td>MACS</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

DISCUSSION

Parameters of growth, goniometric evolution to assess the range of motion (ROM), Ashwarth scale to assess spasticity, were taken as assessment criteria to observe the effect of therapy. The treatment plan was devised in order to improve the overall condition of the patient. Also, the symptoms relate it to the Pakshavadha described in Ayurveda which is a Vataja disorder and thus the treatment was planned on the line of Vatavyadhi Chikitsa. The 2 months of treatment had significant improvement in the condition of the patient.

The probable mode of action of the Treatment Procedures:

The Sarvanga Abhyanga and Nadi Sweda provide nourishment; pacify Vata and produces softness as Mardavajanan (production of softness) is the property of both Abhyanga and Swedana. Bala
Ashwagandha Taila contains mostly Tridosha especially Vata hara and Balya (nourishing) ingredients, thus, can be attributed to pacify Vata and provide nourishment. In addition, the Dashmoola Kwatha Nadi Swedana pacifies Vata, as the main action of Dashmoola being Vatahara it also acts to reduce spasticity (Stambha), Hypertonicity (Gaurava), and produces sweat thus softening the skin.

“Basti”\textsuperscript{13}, is known to be the best to pacify Vata. This Majja Kshira Basti given in the form of Matra Basti alleviates Vata, purifies the body by removing toxins carrying out Mridu-shodhana and provide nourishment to the patient. As it is said in Ayurveda classics that brain contains majja in the form of masthishka majja and in above case due to cerebral atrophy there is kshaya of majja in brain. Hence, Majja Kshira Basti. Majja, have Ushna Virya, Guru Vipaka and potent Vatahara properties. . Kshira has Snigdha, Madhur and medhya properties which may further do Shamana of Vata Dosha .Brahmi, Ashwagandha and Shatavari powders which are used in matra basti as prakshepa dravyas are the Medhya Rasayanas which have nootropic effects (Stimulation of Mental activities and increasing intellect) as they are nerve tonics\textsuperscript{14}.

Thus, by the combined actions of the different therapies and drugs, there is overall relief in the symptoms of the patient as per the results shown. All this progress attributes to the Vata Shamaka and Brihmana properties of drugs used in the treatment.

CONCLUSION

As observed from the results, in first month the effects of the treatment were a success, though minimal which results in decreased atrophy and hyper tonicity of the muscle with some improvement in mental functions. Whereas when the treatment was further extended there was significant improvement in almost all the parameters taken. The muscle power increased to grade 4 in both right upper and lower limb and a significant improvement was noted in mental functions. Hence, the damage brought about by cerebral atrophy due to Wallerian Degeneration though not fully reversed but can be improved to a significant extent especially in case of moderate Cerebral Palsy as this one. And with the continuation of the treatment we hope for much better results coming forth.
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