

Ayurvedic approach in the management of spinal cord injury: A case study

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ABSTRACT

Spinal cord injury (SCI) is associated with consequences such as full loss of spinal movements, incontinence of bladder functions, bed sores, etc. There is no satisfactory treatment available in biomedicine with only limited treatments only for enhancement of spinal cord function. These treatments have many limitations. Ayurvedic drugs and *Panchakarma* procedures have been in use to treat such conditions since a long time. We present a case of SCI with lesion at C4 level which was treated for 2 months with an Ayurvedic combined intervention. The combined treatment plan involved Ayurvedic oral medications (*Brhadvātacintāmaṇi rasa* - 125 mg, *Ardhanāgavātāri rasa* - 125 mg, *Daśamūla kvātha* - 40 ml, *Aśvagandhācūrṇa* [powder of *Withania somnifera* DUNAL] - 3 g, *Amṛtā* [*Tinospora cordifolia* WILLD] - 500 mg, *Muktāśukti piṣṭi* - 500 mg and *Trayodaśāṅga guggulu* - 500 mg) twice daily. Combined procedures involved such as *śālīsaṣṭika piṅḍasvedana* (sudation with medicated cooked bolus of rice) every day for 2 months and *Mātrā basti* (enema) for first 15 days with *Aśvagandhā* oil. From 16th day, *Mustādi yāpana basti* (MYB, enema with medicated milk) was given for 16 days. After an interval of 7 days, MYB was further repeated for next 16 days. Substantial clinical improvement was reported after 2 months of the Ayurvedic treatment in existing neurological deficits and in quality of life.

KEYWORDS: *Matra basti*, *Mustādi yāpana basti*, patient centered outcome, quadriplegia, spinal cord injury, stem cells therapy

The major hurdles in complete recovery from SCI are mostly due to the up-regulation of certain inflammatory molecules after injury that results in gliosis. Various surgical procedures, stem cell implantation therapy and other medical interventions are employed in modern medicine but with much limitation. Ayurvedic intervention may impart complete recovery from SCI by treating secondary injury. This case report is of a patient with SCI with C4 level lesion having achieved substantial recovery with Ayurvedic intervention.

CASE REPORT

On February 11, 2014 a 70-year-old patient came for consultation in the *Panchakarma* O.P.D. of National Institute of Ayurveda, Jaipur, India. He was admitted and examined in the I.P.D. of the Institute. Upon examination, it was revealed that he was unable to move either of the upper or lower limbs. He was fully conscious and awake except that he was not able to move any part of his body. His spine was stiff and hence he was unable to turn on the bed or to sit even with support. Patient had autonomic dysfunction and was neither able to feel nor control the urge for micturition and defecation [Table 1]. The patient had a history of trauma on head due to collapse of a wall on him in the evening of June 26, 2013. After the accident, he remained unconscious for about 2.5 h and regained consciousness on the way to hospital. The accident had led to multiple wounds on his head, face,

INTRODUCTION

The prevalence of acute traumatic spinal cord injury (SCI) is estimated to be 236 per million in India.^[1] Much of the morbidity associated with SCI occurs due to the limited intrinsic ability of the spinal cord to recover following transaction or contusion. The pathophysiology of SCI is considered biphasic in nature. Primary injury results from mechanical force injuring the spinal cord. Secondary injury occurs via the subsequent edema, ischemia, inflammation, cytokine production, free radical damage, glial scar formation, apoptosis, and necrosis.^[2]

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Table 1: Neurological finding in a case of spinal cord injury before and after the Ayurvedic therapy

Symptoms/signs	Before treatment	After 2 months of treatment
Ability to turn on the bed	Absent	Present
Ability to sit with support	Absent	Present
Ability to stand	Absent	Present
Ability to walk	Absent	Can walk more than 500 m and more than 30 min
Muscles function grade		
Right shoulder	1	3
Left shoulder	1	3
Right elbow	0	3
Left elbow	0	3
Right wrist	1	3
Left wrist	1	4
Right hip	1	5
Left hip	2	5
Right knee	1	5
Left knee	2	5
Right ankle and toes	2	5
Left ankle and toes	2	5
Sensory function	No deficit	No deficit
Reflexes		
Right biceps jerk	1	1
Left biceps jerk	1	1
Right triceps jerk	1	1
Left triceps jerk	1	1
Right knee jerk	2	1
Left knee jerk	2	1
Right ankle jerk	1	1
Left ankle jerk	1	1
Superficial reflexes (anal, bulbocavernosus)	1	1
Grip right hand	Absent	Present
Grip left hand	Absent	Present
Muscle coordination	Absent	Present
Muscle tone right upper limb	Spastic	Less spastic
Muscle tone left upper limb	Spastic	Less spastic
Muscle tone right lower limb	Spastic	Normal
Muscle tone left lower limb	Spastic	Normal
Bowel and bladder activities	Incontinence	Normal

and right thigh. After waking from unconsciousness, he had reported severe headache and inability to move all four limbs. He was admitted to Intensive Care Unit (I.C.U.) for 3 days where suturing of wound had been done along with administration of other supportive medication. In I.C.U., patient had incontinence of urine and stools. On June 28, 2013 magnetic resonance imaging of cervical spine was done. This revealed posterior and bilateral

posterolateral disc osteophyte complex was found at C3/C4 level indenting anterior thecal sac. Focal cord signals, hyperintense on T2W and isointense on T1W sequence, at C3 and C4 was suggestive of cord edema. Posterior and bilateral posterolateral disc osteophyte complex was found at C5/C6 and C6/C7 level indenting anterior thecal sac. A noncontrast computed tomography (CT) scan of the head was performed on July 1, 2013, which revealed no significant abnormality. On July 9, 2013 a CT scan of C1 vertebra to C7 vertebra was done which revealed severe cervical spondylosis with multiple level prolapsed intra vertebral discs. Failing to get any response from the treatment, the patient consulted in O.P.D. of Neurology Department of G.B. Pant Hospital, New Delhi on July 20, 2013. Upon a detailed clinical neurological examination done this time, he was diagnosed with quadriparesis and SCI at C4 level. Patient and the relatives were explained about the unavailability of satisfactory treatment. A CT scan of the cervical spine was advised and it revealed (July 25, 2013) significant changes of cervical spondylosis with endplate irregularity and decrease in intervertebral discs space at C3-4, C4-5, and C5-6 level. The recommended physiotherapy was continued for about 5 months following the injury, but there was no improvement in the clinical condition. After this period, he was treated in an Ayurvedic hospital in Delhi in the hope of better treatment. Ayurvedic diagnosis was *āghātaja sarvāṅgaroga* (neurological problems due to trauma).^[3,4] The patient was prescribed *śirodhārā* (continuous pouring of medicated liquid on head) with *dhānvantaram* oil and whole body massage with this oil.^[5] Patient had taken this regimen for 7 days in January 2014. There was no clinical improvement during this period, but the patient had the feeling of well-being. Then the patient discontinued treatment as it was costly. He remained away from direct medical supervision for next 1 month. After this, the patient came to our institute in the hope of better Ayurvedic management. He was diagnosed for *āghātaja sarvāṅgaroga* in our Institute and was treated on the line of management of *vātavyādhi*.

Oral medication administered to the patient included: A combination of *Bṛhadvātacintāmaṇi rasa* - 125 mg, *Ardhanāgavātāri rasa* - 125 mg, *Aśvagandhācūrṇa* (powder of *Withania somnifera* DUNAL) - 3 g, *Amṛtā* (*Tinospora cordifolia* WILLD) - 500 mg, *Muktāśukti piṣṭi* - 500 mg and *Trayodaśāṅga guggulu* - 500 mg that were given twice a day for 2 months along with *Daśamūla kvātha* - 40 ml. *Śālīsaṣṭika piṇḍasvedana* (SPS) (sudation with medicated cooked bolus of rice), *Mātrā basti* (oil enema) and *Mustādi yāpana basti* (MYB) (enema with medicated milk) were prescribed.

DISCUSSION

As there is no specific line of treatment for *sarvāṅgaroga*, general line of treatment for *vātavyādhi* was adopted to treat this condition. Due to the spastic nature of the disease SPS (sudation with medicated cooked bolus of rice) and *Mātrā basti* (MB) (enema using medicated oil) with *Aśvagandhā* oil was given for first 15 days.^[6] In addition to these local therapies, the patient was also recommended oral Ayurvedic drug regimen as described earlier twice a day for 2 months. After 15 days of the therapy, little improvement was observed in neurological deficits. Most remarkably, the patient had gained control on the urge for micturition and defecation. Initially, the patient was not able to retain MB for more than 1 min but after 7 days, he was able to retain MB for about 30 min. After 15 days of therapy, to maximize the therapeutic effects *Panchakarma* procedure was changed to MYB (enema with medicated milk) and SPS. From 16th day, MYB (enema with medicated milk) was given for 16 days. After an interval of 7 days, MYB was further repeated for next 16 days [Table 2]. After 2 months of Ayurvedic therapy administered by us, the patient was found to have a substantial recovery of neurological deficits. He was able to turn on the bed unaided, able to sit unaided for more than 30 min and was able to walk without any support. He was able to move all the joints of the four limbs and was able to move his fingers. He was able to grip using both hands and was able to eat with his hands with minimal support. An interview with patient and his

caretakers reflected their satisfaction with the outcome achieved in 2 months of therapy [Videos 1 and 2].

For assessment of qualitative improvements in the life of the patient with SCI, Spinal Cord Independence Measure (SCIM-III) scoring was used. Improvement was assessed by observing the level of independence achieved after the therapy.^[7] A 17 item SCIM-III has a range of scores 0-100 where 0 denotes a complete dependence, and 100 denotes a complete independence. Higher scoring in net score is indicative of decreasing dependence. We observed an increasing independence in this case. The net SCIM-III score was 10 before treatment which increased to 88 after treatment. The complete independence of functions was not found in this case, but this treatment had certainly reduced the level of dependence as was observable with the improved SCIM-III score.

Aśvagandhā oil and *ghṛta* therapies were mainly employed in this case. In various experimental studies of ketogenic diet in rodents, substantial improvements in many intractable neurological conditions are reported. 24 *Sneha pravacāraṇa* (preparations employed for oleation therapy) are the best examples for the administration of Ayurvedic ketogenic diet in which abhyaṅga (oleation/massage) and basti are also considered along with rice, gruel, etc.^[8] Increased ketone bodies in blood (β -hydroxybutyrate, acetoacetate, and acetone) cross the blood-brain barrier and enter neuronal and glial cells through monocarboxylic acid transporters (MCTs) of which MCT1 is the primary

Table 2: Ayurvedic treatment given to a case of spinal cord injury

Name of the drug used orally	Composition	Dose	Anupana	Days of treatment
<i>Bṛhadvātacintāmaṇi rasa</i>	Au, Ag, <i>Abhraka</i> , <i>Moti</i> , <i>Praval</i> , <i>Lauha</i> , Hg, S	125 mg twice a day	Honey	2 months
<i>Ardhanāgavātāri rasa</i>	Hg, Cu, S, <i>Trikaṭu Jambīra</i>	125 mg twice a day	Honey	2 months
<i>Daśamūla kvātha</i>	A decoction of roots of 10 herbs	40 ml twice a day	-	2 months
<i>Aśvagandhā cūrma</i> (<i>Withania somnifera</i> DUNAL)		3 g twice a day	Milk	2 months
<i>Giloy</i> (<i>Tinospora cordifolia</i> WILLD)		500 mg twice a day	Honey	2 months
<i>Amṛtā piṣṭi</i>		500 mg twice a day	Honey	2 months
<i>Trayodaśāṅga guggulu</i>		500 mg twice a day	Honey	2 months
Panchakarma procedures	Method of preparation	Method of application	Days of treatment	
<i>Śālīṣaṣṭīka piṇḍa sveda</i>	A bolus of rice boiled in milk and <i>Balā kvātha</i>	Whole body massage for 45 min with the help of a cotton bag filled with bolus	2 months	
<i>Aśvagandhā oil mātrā vasti</i>	Mixed with rock salt	Given after meal with <i>Vasti Yantra</i>	First 15 days	
<i>Mustādi yāpana vasti</i>	<i>Saindhava</i> salt 5 g, honey 25 g, <i>Aśvagandhā oil</i> 50 ml, <i>Pañcatikta Ghṛta</i> 25 ml and milk processed with <i>Mustādi yāpana vasti kvātha</i> drugs 300 ml and soup of goat femur bone marrow 50 ml	Given before meal with <i>Vasti Yantra</i>	From 16 th day for 32 days (16 days each in two set) with 7 days of interval	

isoform found in astrocytes, oligodendrocytes, and endothelial cells. MCTs facilitate the transport of monocarboxylic acids such as lactate, pyruvate, and ketone bodies across biological membranes and play a role in neuroprotection leading to the improved recovery of neuronal function after SCI.^[9-12] Multiple mechanisms may account for the neuroprotective effects of ketones, which may be in part due to the reduction of neuronal excitation due to several mechanisms including the inhibition of vesicular glutamate transporter by acetoacetate, and increased adenosine levels and increased activity of the ATP-sensitive K⁺ channels and dampen excitation.^[13]

Various studies have been done on bone mesenchymal stem cells implantation in SCI. In MYB bone marrow was used as an ingredient. When bone marrow is administered through *basti*, it may work like bone marrow implantation. In one study stem cells implantation was done with curcumin in SCI which impart a very good result in the recovery of SCI.^[14] Curcumin (diferuloylmethane) is the active ingredient of turmeric (*Curcuma longa* L.) which is a *tikta rasa* (bitter taste) dominant plant. Likewise, other drugs which have *tikta rasa* dominance may have a positive impact on recovery in SCI. MYB is a combination of drugs many among which have *tikta rasa* dominance such as *Dāruharidrā* (*Berberis aristata* DC.) and *Aśvagandhā* oil, Ghr̥ta, majjā and honey are other components.^[15] Various factors described above may be the cause of good recovery in SCI treated with MYB of this case report. *Tikta rasa* has *śothaghna* (anti-edematous and anti-inflammatory) and *pittahara* properties (suppression and elimination of deranged *pitta doṣa*). Ghr̥ta and honey have madhura rasa (sweet taste) dominance. The combinations of these drugs act as *vāta* pittahara (suppressors and eliminators of deranged *vāta* and *pitta doṣas*) that reduce inflammation and treat the paralytic condition. In any type of paralysis abhyaṅga (oleation/massage), svedana (sudation) and mṝdu virecana (mild purgation) are the lines of treatment as indicated in Caraka Saṁhitā. Tiktādi kṣīra basti is also indicated for any bone pathology in Caraka Saṁhitā.^[16] All these principles were applied for combined Ayurvedic management used in this case. Initially there was no retention of MB. Patient had no proper bowel evacuation. Due to MB, bowel was properly evacuated and retention of MB gradually increased.^[17] In this way, incontinence of bowel was reduced in this patient. *Bṛhadvātacintāmani rasa* which was used in treatment is indicated in all type of *vātaja* (diseases due to *vāta doṣa*) and also respiratory diseases.^[18] *Ardhanāgavātāri rasa* is helpful in *vātika* disorders and in hemiplegia.^[19] *Daśamūla kvātha* has *tridoṣaghna* property (alleviates deranged *doṣas* of the body) and is helpful in all types of *vātika* and

respiratory disorders.^[20] *Aśvagandhā* and *Amṛtā* have *rasāyana* (immunomodulatory) and *balya* (anabolic) properties.^[21,22] *Muktāśukti piṣṭi* is indicated in *udar roga* (splenic and hepatic diseases) and is helpful in G.I.T. disorders such as hyperacidity.^[23] *Trayodaśāṅga guggulu* is useful in *snāyugataṅgavāta* (~various tendon and ligament disorders), *asthigataṅgavāta* (disorders of bone), *majjā gataṅgavāta* (disorders of bone-marrow), *khaṅjavāta* (limping disorders), and various *vātika* disorders (~neurological, rheumatological, and musculoskeletal diseases).^[24] These drugs have the capabilities to address all the manifestations of SCI. A good result was obtained in this case. An informed consent was taken from patient for this case study. Results obtained in this case demonstrate that management of stabilized SCI with *Pancakarma* procedures and Ayurvedic intervention may offer a good approach to manage neurological deficits. This approach may be useful for clinical practices and further studies on treating SCI.

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