Spinal Injury-induced Paraplegia Improvement after Panchakarma

ABSTRACT

Spinal cord injury (SCI) is life-disrupting condition. Historically, it has been associated with very high mortality rates. Paraplegia is impairment of the motor or sensory functions of the lower extremities often including the lower part of the trunk. It is usually caused by SCI. The area of spinal canal that is affected in paraplegia is the thoracic, lumbar, or sacral regions. Here, an attempt is made to explain the case of a 26-year-old female with burst fracture L1 (AO type A) with American Spinal Injury Association (ASIA) paraplegia with bowel bladder involvement due to a fall from height. Pedicle screw fixation was performed at three vertebral bodies (D12, L1, and L2). Even after surgery, complete motor and sensory deficit was present in bilateral lower limb, bowel, and bladder. According to the Ayurvedic view, patient was diagnosed as a case of “Adharanghata” and was planned for Panchakarma procedures as Udwartana (powder massage), Virechana, and Yapana Basti for 2 months.

OUTCOMES: Patient’s spinal cord independent measure (SCIM) score improved to 88/100, which was 51/100 at the beginning of Panchakarma. Patient developed motor and sensory activities of the lower limb without difficulty and also became independent in basic activities of daily living like bathing, toileting, climbing, etc. She became independent in instrumental activities of daily living like going to the market, hospital, and temple. After the above course of procedures, the patient showed marked improvements in sensory and motor modalities. The patient on wheelchair could now walk without support.

Keywords: Adharangaghata, Panchakarma, Yapana basti.

INTRODUCTION

Spinal cord injury is a medically complex and life-disrupting condition. The SCI has been described as one of the greater calamities that can befall humans. Learning of the paralysis, bladder and bowel dysfunction, dependency on others, mobility limitations, and high risks of complications (such as pressure ulcers) that a spinal injury entails, most people who contemplate being forced to live this way cannot see anything but a life of low quality and conclude that they would rather be dead. Many individuals who actually incur an SCI indeed feel this way, at least initially. Some people with SCI very rationally decide to commit suicide, and others may do so during a period of depression and despair that is not uncommon after SCI. Traumatic SCI often remains a terminal condition. Most people with SCI in a country, such as Sierra Leone die within a few years of injury. In low-income countries, and in many middle-income ones, the availability of quality assistive devices, such as wheelchairs is very limited, medical and rehabilitation services are minimal, and opportunities to participate in all areas of personal and social life are constrained. The report follows the publication of the World Health Organization/World Bank report on disability in 2011, and explores one major health condition in greater detail than was possible in that wide ranging study.

Adharanghata comes under vataryadhi, which can be correlated with paraplegia. Holistic and authentic approaches of Ayurveda illuminate treatment modalities for the whole body rather than a particular organ. Keeping this in mind, a complete protocol was planned based on Vataryadhi treatment for this patient including udvartana (dry powder massage), medicated purgation, and medicated enema (Yapana Basti) to regulate the vata or neurological functions of body.

CASE REPORT

A 26-year-old female patient had fractured the D12-L1-L2 vertebra after a fall from a staircase and had sustained D12-L1-L2 incomplete SCI (Fig. 1). At 2 days postinjury, the patient had undergone surgery to stabilize the fractured vertebra, i.e., D12-L1-L2 pedicle screw fixation (Fig. 2) for one time and then was referred to physiotherapy. Then, the patient was brought to the outpatient department of Panchakarma, Institute of Post Graduate Teaching & Research in Ayurveda, Jamnagar, India, after 2 weeks of operation.

On neurological examination, muscle strength, light touch, pinprick sensations were impaired below D12,
except for proprioception and kinesthesia, which were intact. According to ASIA, the patient had an ASIA impairment scale grade A. Patient's score on SCIM was 51/100.

Patient lost her bladder and bowel control and was on indwelling catheter. Patient was on wheelchair and lives with uncle’s family. Patient was helping the aunt in household work and after 2 months her marriage was proposed. During the initial evaluation, patient was found to be depressed and had terrible fear because of this unexpected event. Patient was worrying about future because of the ambiguity in the prognosis and expressed strong feelings of frustration caused by the disability effects of SCI.

**Presenting Complaints**
- Poor motor and sensory recovery
- Paralysis of trunk and lower extremity bilaterally
- Weakness in gluteal, thigh, gastrocnemius, ankle, and planter muscles bilaterally
- Impaired light touch, pinprick sensations below the level of lesion
- Requires assistance for eating, brushing, dressing, grooming, bathing, bladder and bowel program, and dependent on wheelchair for all mobility

On history, clinical examination, and necessary investigations, she was diagnosed as a case of “paraplegia.” Her preoperative investigations were: random blood sugar 154.00 mg/dL, hematocrit 36.40%, total lymphocyte count 17,600/cu mm, neutrophils 93.00%, lymphocytes 3.00%, and erythrocyte sedimentation rate in the first hour was 4.00. Coagulation profile was normal.

**Panchakarma Intervention**

Treatment was started with internal medicine as described to enhance the agni (digestive fire) and udwarta procedure for 7 days followed by classical mrudu Virechana. After completing Samsarjana, the patient was planned for Yapana Basti. Whole body massage and fomentation (Sarvang-Abhyanga Swedana) were done, followed by Rajyapana Basti for the next 7 days. Patient started feeling sensations in both legs and was able to stand with support. Hence, basti was continued for 14 days.

**Treatment given**
- **Deepana-Pachana:** Shivakshar Pachana churna: 5 gm BD
- **Udvartana:** Triphala churna and Yava Churna
- **Snehapana:** Dhanvantara ghrita in increasing dose according to Koshtha and Agni:
  - 1st day: 30 mL
  - 2nd day: 60 mL
  - 3rd day: 90 mL
  - 4th day: 120 mL
- **Virechana yoga:** Avipattikar churna 15 gm + honey
  - Patient has achieved Madhyama shuddhi
  - Samsarjana krama has been done for 5 days
- **Sarvang Abhyanga-Swedana:** Abhyanga with Pinda tail and Bashpa sweda
- **Rajyapana Basti:** has been given for 14 days.
  - Contents are:
    - Decoction: 400 mL
    - Honey: 70 gm
    - Rock salt: 10 gm
    - Kalka: Yashtimadhu powder: 50 gm
    - Putoyavanyadi powder: 5 gm
    - Sneha: Dhanvantara taila: 30 mL
    - Vatsyamayantaka ghrita: 30 gm
    - Mamsrasa (Meat soup): 100 mL
- **Physiotherapy**

**Outcome**

Periodical assessments were made with a gap of 15 days duration. The muscle strength of the key muscles, which
was taken with 15 days interval, is summarized in Table 1. Muscle tone and bulk was normal. Outcome of reflexes as summarized in Table 2.

### RESULTS

The patient came here on a wheelchair (Fig. 1). Patient has developed motor and sensory functions in bilateral lower limb and bowel and only sensory function in bladder. After Basti, patient was able to walk for the first few days with walker, then with a stick, and, after that, patient started to walk without support (Fig. 2). Along with that, physiotherapy had been continued for 2 months. After completing parihara kala of Basti, the patient got control over bowel habits and micturition completely. Patient is still on clinical follow-up and she is now able to walk without any support.

### DISCUSSION

Panchakarma is very effective in vata disorders as this is the case of Adharngaghata. So, whole management with Panchakarma was planned. Dipana and pachana are to prepare the body for snehapana so ruksha drugs like Shivakshar pachana powder and Triphala guggulu were selected. Triphala guggulu specified to avoid any kleda or infection in urinary tract as patient was daily doing catheterization by self. To extend the result of rukshana at cellular levels of skin and nerve, externally Udwartana with triphala and yava powder was done. With this treatment for 7 days, patient started having a slight feeling of sensation in lower limbs. As patient could sit in a wheelchair, Virechana was planned. Dhanwantharam ghritam, which has been instructed in vata disorders, was taken for snehapan and avipattikar churna as suka virechana was given with honey. On the day of virechana, the patient was sitting on a special chair, which was planned for easy evacuation of stool.

Basti is the main procedure explained in the context of vataroga or neurological diseases. It shows a great impact on the sensory and motor functions. Rajayapana basti is very effective in spinal cord diseases. Sadhya Balajanana, brimhana, rasayana, sataparna, and the mamsabala janana property of Rajayapana basti might be the cause for improvement in motor and sensory modalities of lower limb. The SCIM score was used to assess the effect of Panchakarma management and it showed high improvement after this course of Panchakarma.

In 1992, Wernig and Muller reported that treadmill (laufband) locomotion with body weight support improved walking in people after severe SCIs. They trained eight people with “incomplete” SCI for 1.5 to 7 months (5 days/week, 30–60 minutes/day) beginning 5 to 20 months after injury. This training significantly improved locomotion capabilities, including the ability to walk unsupported 100 to 200 m on a flat surface. Their additional work demonstrates that these training benefits can be maintained without further training. Data on 987 subjects showed that, 94.4% of subjects with neurological complete SCI at 1 year remained so at the 5-year postinjury evaluation. Only 3.5% improved from ASIA grade A (complete motor and sensory) to grade B (sensory incomplete including S4-5), up to 1.05% improved from grades A to C (motor incomplete, less than half of key muscles below the neurological level with power of 3 and above), and with another 1.05% to grade D (motor incomplete, half or more of key muscles with power of 3 and above). Nevertheless, approximately 20% showed some improvement in motor power and neurologic level of injury from year 1 to year 5. Although they cannot conclude that the activity-based recovery program produced the functional benefits, they believe it was responsible for the physical benefits. As this outcome was seen in a worst case scenario, the program might provide even more dramatic benefits for individuals who are less severely injured (ASIA grades B–C).

### Table 1: Assessment of muscle strength

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Before treatment</th>
<th>After 15 days</th>
<th>After 1 month</th>
<th>After 2 months</th>
</tr>
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<tbody>
<tr>
<td>ADF</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>APF</td>
<td>0</td>
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<td>HAB</td>
<td>0</td>
<td>1</td>
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<td>HAD</td>
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<tr>
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<tr>
<td>KE</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>KP</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

ADF: Ankle dorsiflexors; APF: Ankle plantar flexors; HAB: Hip abductors; HAD: Hip adductors; HE: Hip extensors; HF: Hip flexors; KE: Knee extensors; KP: Knee flexors

### Table 2: Assessment of reflexes

<table>
<thead>
<tr>
<th>Reflexes</th>
<th>BT</th>
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<tbody>
<tr>
<td>Achilles tendon</td>
<td>1+</td>
<td>2+</td>
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<tr>
<td>Patellar tendon</td>
<td>1+</td>
<td>2+</td>
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<tr>
<td>Knee jerk</td>
<td>1+</td>
<td>2+</td>
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<tr>
<td>Babinski response</td>
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<td>2+</td>
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Magnetic resonance imaging—1st after injury

<table>
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<tr>
<th>AGE / SEX</th>
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<tr>
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<tr>
<td>DATE</td>
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**MRI OF LUMBAR SPINE**

**Protocol:**
Multiplanar multiecho various T1 and T2 Wt sequences, Screening sagittal T2 Wt sequence through whole spine

**Clinical Information:**
H/o fall down from height. Presented with bilateral lower limb paraparesis and bowel / bladder involvement.

**Observations:**
- Normal lordosis of lumbar spine is seen.
- Burst wedge compression collapse fracture of L1 vertebra is seen (approx. 55-65%).
- Abnormal marrow signal changes are seen involving L1 vertebra appear hypointense on T1 Wt images and hyperintense on T2 Wt IRFSE images suggest contusions / marrow oedema.
- Retropulsed body of L1 vertebra is seen indenting the dural sac, impinging the conus, impinging upon bilateral nerve roots, compromising the neural foramina and spinal canal (lateral canal also). Extradural myelographic block is seen at this level.

Magnetic resonance imaging—2nd after surgery (before Panchakarma)

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**MRI SCREENING OF LUMBAR SPINE**

**Protocol:**
Sagittal T1 and T2 Wt sequences, Coronal T2 Wt IRFSE sequence.

**Clinical Information:**
Post operative status in a case of L1 fracture.

**Observations:**
- Normal lordosis of lumbar spine is seen.
- Trabecular fracture of L1 vertebra is seen.
- Minimal compression of superior endplates of L1 vertebra is seen (approx. 2-5%). It appear hypointense on T1 Wt images and hyperintense on T2 Wt IRFSE images suggest residual marrow oedema/contusions.
- No definite retropulsion is seen at present. No definite compression over nerve roots or cord is seen at present. Spinal canal diameter measures approx. 10 mms. at L1 level.
- T2 Wt images show hyperintense signal changes involving lower spinal dorsal cord extending from D11-12 to D12-L1 level and conus level suggest resolving contusions.
- Posterior paraspinous & subcutaneous soft tissue oedema is seen.
Artifact +++ due to implant at post operative site.

EXAMINATION: MRI STUDY OF LUMBO-SACRAL SPINE WITH WHOLE SPINE SCREENING

CLINICAL PROFILE: C/o low back pain and not able to pass urine voluntarily. Post operative for L1 burst fracture.

**IMPRESSION:** in a known case of post operative for L1 burst fracture, above MRI findings as compared with plates dated on 12.01.2015 are suggestive of-

- An old healed fracture involving L1 vertebral body however no evidence of collapse or compression.
- No evidence of pre or paravertebral soft tissue edema in present scan.
- Posterior para spinous region appears normal.

Clinical co-relation suggested

Operative notes

<table>
<thead>
<tr>
<th>Pre Operative Diagnosis:</th>
<th>Burst fracture L1 (AO type - B) with ASIA – A paraplegia with bowel bladder involvement.</th>
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<tr>
<td>Procedure:</td>
<td>D12 – L1 – L2 pedicle screw fixation.</td>
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<tr>
<td>Post Operative Diagnosis :</td>
<td>Burst fracture L1 (AO type - B) with ASIA – A paraplegia with bowel bladder involvement.</td>
</tr>
</tbody>
</table>

Operative notes

**DIAGNOSIS AT ADMISSION**
Burst fracture L1 (AO type - A) with ASIA - A paraplegia with Bowel bladder involvement In case of fall down.

**DIAGNOSIS AT DISCHARGE**
Burst fracture L1 (AO type - A) with ASIA - A paraplegia with Bowel bladder involvement In case of fall down.

Fig. 3: X-ray, pedicle screw fixation
Whether surgery improves recovery is unclear, and may be dependent on whether the indication is for decompression or for stabilization, and is possibly helpful in the former. Studies on the best timing of surgery are inconclusive, but routine early surgery may not improve neurological outcome. The use of brain neural activity to control machines and devices is an exciting development still in infancy. In a retrospective study of 284 traumatic and nontraumatic SCI subjects, older individuals >50 years were found to do well with independence as per activities of daily living scales, and had shorter lengths of stay. However, they had less favorable outcomes with walking, bladder and bowel independence, and a higher rate of complications.

Recently, a meta-analysis and systematic review concluded that evidence from multiple randomized controlled trials and also from observational studies do not support methylprednisolone use in acute SCI since it has no long-term benefits. Besides, it increases gastrointestinal hemorrhage and has a trend to increase overall adverse events.

The author evaluated the potential for functional recovery from SCI. The patient had complete motor and sensory deficit in bilateral lower limb, bowel, and bladder. Patient’s condition was classified as ASIA grade A and she had experienced no recovery in the first 22 days after traumatic SCI. Clinical experience and evidence from the scientific literature suggest that further recovery would not take place. When the study began, the patient was paraplegic and unable to move without wheelchair; her condition classification persisted as L1 (AO-type A) ASIA grade A. Magnetic resonance imaging (MRI) revealed severe injury at the L-1 level that had burst wedge compression fracture. After the injury and operation, a Panchakarma protocol was instituted. Over a period of 2 months (3 months after injury), the patient’s condition improved from ASIA grade A to ASIA grade D, an improvement of three ASIA grades. Motor scores improved from 51/100 to 88/100. Primary novelty of this report is that the substantial recovery of function (three ASIA grades) is possible in a patient with severe L-1 ASIA grade A injury, in a short period after the initial SCI.

CONCLUSION
This case indicates that Panchakarma procedures are beneficial in achieving functional grip in L1-L2 SCI. This will enable the functional independence in higher level SCIs. It is also important to utilize the Basti in paralyzed patient to improve quality-of-life, so basti can be considered as prime treatment in SCI cases. Thus, the promising results which were obtained give hope for being researched further. Less-severely injured (lower injury level, clinically incomplete lesions) individuals might achieve even more meaningful recovery. The role of Panchakarma in regeneration and recovery of function after SCI, therefore, appears a fruitful area for future investigation.

ASIA Score
- A = Complete: No sensory or motor function is preserved in sacral segments S4-S5.
- B = Incomplete: Sensory, but not motor function is preserved below the neurologic level and extends through sacral segments S4-S5.

MRI report

Fig. 4: Magnetic resonance imaging on different levels
• C = Incomplete: Motor function is preserved below the neurologic level, and most key muscles below the neurologic level have a muscle grade of less than 3.
• D = Incomplete: Motor function is preserved below the neurologic level, and most key muscles below the neurologic level have a muscle grade that is greater than or equal to 3.
• E = Normal: Sensory and motor functions are normal.

REFERENCES
हिंदी सारोच
मेरुदंड आयात जनित अवसारूपणात येथे पंचकर्म का प्रभाव

राजकन्या थिय, पादेल, *अनुप थिय, शाकर, *कर्तर एस. धीमान, *पंचकर्मी थिय, पादेल
मेरुदंड (श्रेणी की हड्डी) की चोट एक संकट और जीवन व्यर्थ स्थिति है ऐतिहासिक रूप से, यह भव्य अविष्कार गृहु दर के साथ जुड़ा हुआ है। श्रेणी की हड्डी की नात्र के क्षेत्र को इस रोग में प्रभावित होता है अतः कोई उपचार हिस्से के संबंधी कार्यों में बाधा आती है। इस कंस सियोर ने 26 वर्षीय महिला जो की इस रोग (Spinal cord injury) से पीड़ित है जिसमें L-1 जोकर हुआ था। सज्जी के बाद भी, यह चल नहीं पा रही थी और शरीर के नीचे के हिस्से में कोई संवेदना भी नहीं थी। आयुर्वेदिक आयुर्विज्ञान के अनुसार, रोगी की "अवसारूपण" की तरह आकर्षण करके पंचकर्म के आयात पर विकिर्त की गयी। जिसमें दिनर्चन (पाँचकर सन्नाट), विरोध और यावन वस्ती के रूप में 2 महीने तक विकिर्त की गयी जिसके बाद यह रूपन जो धीरजेबर पे आया था वह अपने पैदे से चलक गया।