ISSN: 2322 - 0902 (P)
ISSN: 2322 - 0910 (O)

International Journal of Ayurveda and Pharma Research

Case Study

AYURVEDIC NEURO-REHABILITATION AFTER SURGICAL RESECTION OF INTRAMEDULLARY EPENDYMOMA

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Article info

Article History:
Received: 07-02-2026
Accepted: 12-03-2026
Published: 10-04-2026

KEYWORDS:
Intramedullary Ependymoma, *Sarvangavata,* Neuro-rehabilitation, Spinal cord tumor.

ABSTRACT

Ependymomas are rare neuroectodermal neoplasms of the central nervous system. Intramedullary ependymomas arise from the ependymal cells lining the central canal of the spinal cord and account for approximately 50–60% of intramedullary spinal cord tumors in adults, with a peak incidence in their fourth decade of life and a slight male predominance. These tumors result in progressive neurological deficits due to compression and infiltration of spinal cord tracts, with clinical manifestations varying according to the level and extent of involvement. Surgical resection remains the treatment of choice, as intramedullary ependymomas are usually well circumscribed and amenable to gross total excision. However, post-operative neurological deficits and functional impairment may persist, necessitating structured and prolonged neuro rehabilitation. From an Ayurvedic perspective, the clinical features and post-operative neurological deficits can be correlated with conditions such as *Dhatu ksayajanya Vatavyadhi* and *Upadhatu Pradosaja Vyadhi* and *Sarvangavata,* depending on the stage of disease and symptomatology. Therapeutic principles including *Ksataja sopha cikitsa*, *Dhatu posana, Vatavyadhi cikitsa*, and *Rasayana chikitsa*, along with appropriate rehabilitative measures, may be adopted to support neurological recovery and functional improvement.

INTRODUCTION

Spinal cord ependymomas are the most common neuroepithelial tumors in adults. [1] Nearly two-thirds of spinal cord ependymomas occur at the cervical level. Intramedullary spinal cord ependymomas are rare, mostly benign tumors that arise from the ependymal cells lining the ventricular system and the central canal of the spinal cord. They account for approximately 50–60% of all intramedullary spinal cord tumors and most commonly occur in adults during the fourth decade of life[2]. Ependymomas are subdivided according to the World Health Organization (WHO) classification into three grades of malignancy: WHO grades I, II, and III[3]. A recent molecular classification system has come into use that subdivides ependymal tumors into 9 groups that more completely describe the biological, clinical, and histopathological features of these tumors. The most common symptoms include pain, weakness, sensory impairment, gait abnormality, and sphincter dysfunction, which can significantly impair daily functioning. Furthermore, ependymomas have varying prognosis based on their age of onset, location, and histopathologic appearance[4]. According to the current gold standard, surgical resection remains the therapy of choice in spinal cord ependymomas, especially for patients presenting with neurological impairments. Postoperative neurological deterioration remains a major problem, since it plays a key role in prognosis[5]. From an Ayurvedic perspective, the condition can be understood as *Arbuda* formation occurring at a site of *Kha-vaigunya* due to *Vata-Rakta dushti* caused by repeated *Abhighata*. Subsequent *Shastra Karma* may lead to a *Dhatu-kshaya avastha*, where surgical intervention results in *Sira-Snayu Vishoshana*, producing *Upadhatu Pradoshaja Vyadhi*. Clinically, this manifests as *Sharira Avayava Sada* and *Kriyasu Asamarthya*, and may eventually progress to *Sarvanga Vata*[6]. Based on this understanding, management was planned according to Ayurvedic principles, including

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https://doi.org/10.47070/ijapr.v14i4.4051

Ksataja Shopha Chikitsa, *Vatavyadhi Chikitsa, Upadhatu Pradoshaja Vatavyadhi Chikitsa, Dhatuposhana, and Rasayana* therapy, implemented at different stages of the disease.

Case Report

Age- 34, Sex- Male, Address- Kanyakumari, Religion– Hindu, Occupation – Paramilitary officer

Presenting Complaints

- Difficulty in lifting the left upper limb since 2 years.
- Stiffness over neck region since 2 years.
- Paresthesia over both upper limbs since 2 years.
- Difficulty in doing fine motor movements of hands since 2 years.
- Tendency to fall while walking if hit into something since 2 years.

History of Presenting Complaints

A 34-year-old right-handed male patient with no known comorbidities was in his usual state of health until four years ago when he developed mild, intermittent neck pain, more pronounced in the early morning. The pain was gradual and progressive in nature, without associated numbness or stiffness. In April 2022, during a period of intensive physical training, he performed 350 sit-ups in a single session as part of a competitive event. Six months later, while doing pull-ups, he experienced difficulty lifting his left hand above head level. He also reported intermittent episodes of giving way in both hips during ambulation. However, there was no evident gait abnormality, and he remained independently ambulant without external support. On 01/10/2022, during a 10km running competition as part of his training, he experienced difficulty running and developed pain in the right gluteal region associated with numbness. He sought medical evaluation and MRI of the cervical spine revealed an intramedullary ependymoma from C1 to C5, and he was referred to a neurosurgeon, who advised surgery. There were no urinary disturbances or other sensory abnormalities at that time. The patient subsequently underwent C2–C5 laminectomy and decompression on 29/11/2022. Postoperatively, he developed left upper limb weakness (proximal > distal), with only flickering movements of the left hand, along with sensory impairment in both upper limbs. He was discharged in a stable condition and was able to ambulate with support; however, significant sensory deficits and marked weakness of the left hand persisted, resulting in an inability to perform basic activities of daily living, including self-feeding. Within a few days of discharge, the patient developed acute onset of vomiting, diarrhea, and fever, followed by a loss of consciousness. He tested positive for COVID-19 and subsequently developed altered sensorium with impaired recognition of family members. During this period, he experienced a generalized seizure. After five days, his condition improved. He regained the ability to recognize relatives and walk with support. However, he had flickering movements of the left hand, neck stiffness, and difficulty performing fine motor tasks such as buttoning clothes and writing. He continued physiotherapy for four months. Gradually, he became able to walk without support, started self-feeding, and showed improvement in movements of the left arm below the elbow. He eventually returned to work. He approached Government Ayurveda College Hospital Thiruvananthapuram, Kayachiktsa OPD, and was admitted for further Ayurvedic management.

History of past illness

No H/o T2DM, S.HTN, DLP, H/o primary infertility.

Family History

Mother had a H/o breast cancer

Educational Status

Diploma in Electronics and Communication.

Occupational History

Since 2014, he has been working as a Paramilitary officer. His nature of work involved strenuous physical activities, including long-distance walking of up to 40km while carrying approximately 30kg of weight during training periods, along with heavy physical exercises. Following surgery, his job responsibilities were shifted to another section with modified duties.

Socioeconomic and Psychosocial History

Belongs to upper middle-class family. The patient lives with his wife in army quarters and maintains a good relationship with family members. He is pleasant by nature, with no significant stress reported.

Marital History

He was married at 27 years and has no children. He received medication for asthenozoospermia in 2024.

Personal History

Bowel– Irregular, constipated, appetite– moderate, micturition– regular, sleep– reduced, difficulty in initiation, allergy– nil, exercise- reduced, addictions- nil, diet- mixed, preferred spicy food and untimely food intake.

General Examination

Conscious, Alert, oriented to time place and person, built and nourishment– moderate, facies– pleasant, gait– normal, PICCLE– absent, Ht– 174cm, Wt– 64kg, BMI– 21.1kg/m^2, PR– 72/min, regular, rhythmic, full volume, HR– 72/ min, regular, BP– 100 /72 mmHg, right hand sitting, RR- 16/ min.

Nervous system examination

Higher mental functions- Intact, Cranial nerve - CN IX & X (Glossopharyngeal & Vagus): Voice- Low volume; uvula deviated slightly to left; palate movements normal. CN XI (Accessory): Sternocleidomastoid intact; Trapezius mild weakness with wasting on left. Muscle tone –Hypertonic (bilaterally).

Muscle bulk

	Right	Left
Upper arm	26 cm	23cm
Lower arm	25 cm	23cm
Thigh	41.5 cm	41.5cm
Calf	34cm	34cm

Muscle power

	Right	Left
Shoulder	5	Abduction & extension 3, Adduction and Flexion 4-
Elbow	5	4
Wrist	5	4-
Handgrip	Strong	Moderate
Hip	5	4+
Knee	5	4+
Foot	5	4+

	BJ	TJ	SJ	KJ	AJ
Right	2+	3+	3+	3+	3+
Left	2+	3+	3+	3+	3+

Plantar Reflex – Extensor (right), sensory system- Impaired over bilateral U/L and L/L.

Investigations

Hematology

FBS– 75mg/dL, PPBS–145mg/dL, T. Cholesterol–184mg/dL, LDL- 123mg/dL, AEC- 610 cells/cumm, LFT– WNL, RFT – WNL.

Special tests: Hoffman's sign- Positive (bilaterally), Lhermitte sign– Negative, Finger escape sign- Positive (bilaterally), Inverted Supinator Sign– Positive (left), Spurling's test – Negative, Drop arm test – Positive

MRI Cervical Spine (6/10/22). A lobulated expansile intramedullary lesion from C1–C5, T1 hypointense and T2 hyperintense with peripheral enhancement, internal septae, and cystic components, with features of prior hemorrhage, measuring 12 × 20 × 68 mm, causing cord expansion and edema from the cervicomedullary junction to T1- suggestive of cervical spinal ependymoma.

Histopathology report (30/11/2022)

Spinal ependymoma, CNS WHO grade 2, Intramedullary C1- C5.

Ayurvedic Clinical Assessment

Dosha: Vata pitta kapha dushti, Dhatu: Rasa,Rakta, Mamsa, Medas, Asthi, Majja, Sukra Upadhatu: Sira, Snayu Srotodushti: Sangam,Grandhi Roga margam: Madyama, Udbhavasthanam: Greeva, Vyakthasthanam: Sarvasareera, Agni: Madyama

Treatments done

Stage	Internally	Externally	Remarks
Stage 1 *Agni deepanam, Rukshanam*	1. *Gandharvahasthadi kashayam* 90ml bd B/F 2. *Nimbamrtha Eranda tailam*- 10 ml HS with hot water 3. T *Ekangaveera rasam* [7] 1-0-1 A/F	*Udwartanam* with *Kolakulathadi choornam* – 5 days.	Appetite improved. Bowel became normal.
Stage 2 *Sneha sweda*	1. *Ashtavargam kashayam* 90ml bd B/F 2. *Nimbamrtha eranda tailam*- 10 ml HS with hot water 3. T *Ekangaveera rasam* 1-0-1 A/F 4. *Dhanwanthararishtam* 30ml bd A/F 5. *Maharaja prasarani tailam*- 10 ml with *Kashayam.*	*Abhyangam ushmasweda* with *Dhanwantharam tailam* 7 days.	*Sarvavata vikarajith* Neck stiffness reduced

Stage 3 *Sneha sweda*	1. *Ashtavargam kashayam* 90ml bd B/F 2. *Nimbamrtha eranda tailam*- 10 ml HS with hot water. 3. T *Ekangaveera rasam* 1-0-1 A/F 4. *Dhanwanthararishtam* 30ml bd A/F 5. *Maharaja prasaranyadi tailam*- 10 ml with *Kashayam*	*Churna Pinda Sweda* with *Kethakimooladi tailam + Kottamchukkadi tailam* + Physiotherapy.	Mild improvement in sensory symptoms.
Stage 4 *Sodhana*	*Anulomana* with *Nimbamrtha eranda taila* (40 ml) and hot milk.		*Dosha Anulomana*
Stage 5 *Sneha Sweda*	1. *Ashtavargam kashayam* 90ml bd B/F 2. *Nimbamrtha eranda tailam*- 10 ml HS with hot water. 3. T *Ekangaveera rasam* 1-0-1 A/F 4. *Dhanwanthararishtam* 30ml bd A/F 5. *Maharaja prasaranyadi tailam*- 10 ml with *kashayam.*	*Patra Potala Sweda* with *Bala tailam* – 7 days *Matra vasthi* with *Sahacharadi Mezhukupakam* 90ml *Anuvasana vasth*i with *Sahacharadi mezhukupakam*- 150ml	Improvement in muscle power of lower limb and had reduced difficulty in walking.
Stage 6 *Sodhana*	1. *Ashtavargam kashayam* 90ml bd B/F 2. *Nimbamrtha Eranda tailam*- 10 ml HS with hot water 3. T *Ekangaveera rasam* 1-0-1 A/F 4. *Dhanwanthararishtam* 30ml bd A/F 5. *Maharaja prasaranyadi tailam*- 10 ml with *Kashayam.*	*Baladi Yapana Vasthi* [8] - 7 days *Ksheera kashaya (Bala Atibala Atmagupta Apamarga Yavam)* *Ksheerabala tailam* *Kalyanaka ghrta* *Yashtimadhu kalkam*	*Balyam, Rasayanam, Dhatu poshanam, Vrishayam.*
Stage 7 *Brmhana*		*Shashtika Pinda Sweda* -7 days with *Dhanwantharam tailam.*	*Dhatu poshana.* Motor power improved.

Advice on discharge

Maharasnadi Kashayam 90ml bd B/F, *Guggulutiktaka ghrtam* 5 gm bd with *Kashaya*, *Dasamoola hareetaki lehyam* 10g HS, *Pratimarsha nasya- Ksheerabala* plain, *Bala tailam* – External application

Result

At the time of discharge, the patient demonstrated slight improvement in sensory symptoms and motor function.

Assessment scales	Before treatment	After treatment
Nurick Clinical Scale score[9]	Grade 3	Grade 2
mJOA score[10]	13	14

DISCUSSION

In the present case, the patient had a *Vata-Pitta Prakriti* with a contributory *Sahaja nidana* from the mother and exposure to *Vata-prakopaka nidanas* such as *Akalabhojana, Ratrijagarana,* and *Ati-vyayama,* leading to progressive vitiation of *Vata*. Repeated and excessive *Ayasa* resulted in *Abhighata* at the *Sukshma dhatu* level, causing *Vata-Rakta dushti* and the development of *Kha-vaigunya* in the spinal cord, which provided a favourable site for *Arbuda* formation. Further, *Shastra karma* led to *Sira-snayu vishoshana* resulting in *Upadhatu pradoshaja vyadhi* and manifest symptoms such as *Sharira avayava sada*, *Kriyasu asamarthya*, ultimately progressing to *Sarvanga Vata.*

Considering these facts treatment principles of *Kshataja sopha*, *Vatavyadhi chikitsa*, *Upadhatu pradosha vatavyadhi chikitsa*, *Dhatu poshana*, *Rasayana chikitsa* can be adopted at different stages.

Here the treatment starts with internal administration of *Gandharvahasthadi kashayam* and *Nimbamrtha Eranda Tailam* along with *Ekangaveera rasam* aimed to manage *Dosas* at *Koshta* level and *Rasa rasayanam*. External *Rukshana* in the form of *Udwarthana* was also done. After *Agni deepanam* and *Rukshana* the patient felt a generalized well-being his appetite and bowel improved. *Ashtavargam kashayam* was taken as *Vataharam* and *Avaranahara* This was followed by *Sneha Sweda*. *Maharaja prasarani tailam*

taken as for internal *Sneham* due to its action on *Greeva pradesha* along with *Brmhana* and *Rasayana* action. Neck stiffness got relieved after this. Followed by *Snigdha anulomana* was done with *Nimbamruta eranda taila*. After *Sodhana* there was slight improvement in his motor and sensory symptoms. *Brumhana* in the form of *Yapana vasthi* was administered. At this stage considering *Vata* as *the Pradhana dosha* and taking *Klaibya* of the patient into account *Kalyanaka ghrita* was selected for *Vasthi*. *Shashtika pinda sweda* was done as *Brmhana.* At discharge *Maharasnadi Kashayam, Guggulu tiktaka ghrtam, Pratimarsha nasyam* with *Ksheerabala* 41A*, Dasamoola hareetaki lehya, Bala tailam* were prescribed as *Brmhana, Jatrurdhwa vikarajith, Urdhwa sodhanam* and *Rasayana* properties respectively.

CONCLUSION

The case of post-surgical intramedullary ependymoma was managed by adopting the treatment principles based on the *Avastha* of patient and status of *Doshas* along with *Vatavyadhi chikitsa* and *Rasayana* therapy was incorporated with objectives of *Roganam apunarbhavatwam*, *Dhatu poshana* and *Brmhana* aiming to support long term recovery and tissue nourishment. The disease showed only mild improvement following treatment, as it is a *Dhathukshaya Avastha*, making its management challenging. In this study, younger age was considered a favourable prognostic factor due to better outcomes, along with emphasizing strategies to prevent recurrence.

Declaration of Patient Consent:

Patient consent was obtained for including his medical information in the case report.

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Cite this article as:
Suneeshmon M.S, Asha Karunakaran K, Greeshma A M, Dineesha M. Ayurvedic Neuro-Rehabilitation After Surgical Resection of Intramedullary Ependymoma. International Journal of Ayurveda and Pharma Research. 2026;14(4):14-18.
https://doi.org/10.47070/ijapr.v14i4.4051
Source of support: Nil, Conflict of interest: None Declared

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