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# Impact of Health Literacy on Medication Adhernce and Outcomes in Progressive Syringomyelia: A Case Report

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**Abstract: Syringomyelia is a progressive degenerative disorder characterized by formation of a fluid-filled cavity (syrinx) in the spinal cord, which leads to different neurological dysfunctions. The case describes a 54-year-old female agricultural labourer who presented with a history of chronic back pain and progressive neurological symptoms. Her symptoms began five years earlier following a fall while carrying heavy loads during work. Initially, she experienced persistent back pain and sought medical care, where analgesic medications were prescribed. Due to inadequate relief, she later pursued homeopathic treatment for 2 -3 years without improvement. She went to another hospital with complaints of reeling sensation for 15 days, chronic lower back pain for 1-year, bilateral lower limb pain associated with heaviness, difficulty rising from a sitting position, and occasional knuckle pain. Laboratory investigations revealed haemoglobin of 11 g/dL, MCV 77 FL, MCH 23.2 pg, MCHC 30.1 g/dL, and ESR 58 mm/hour. An MRI demonstrated herniation of bilateral cerebellar tonsils 7 mm below the foramen magnum and a focal syrinx at the C6–C7 level. Additionally, disc desiccation and diffuse annular bulges were noted at L3–L5 levels with thecal sac indentation and bilateral neural foraminal narrowing compressing exiting nerve roots. Based on the above findings, a diagnosis of syringomyelia was established. The patient was managed with gabapentin nortriptyline, methyl cobalamin, and calcium vitamin D3. This case highlights the importance of early diagnosis, patient education, and timely neuro-rehabilitation. A multidisciplinary approach plays a vital role in improving patient treatment outcomes.**

***Keywords:*** *Syringomyelia, Magnetic Resonance Imaging (MRI), Neuro-Rehabilitation, Patient Counselling, Treatment Plan.*

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## I. INTRODUCTION

The degenerative condition known as syringomyelia is characterised by spinal cord cavitation, which frequently results in a progressive clinical state that ranges from mild to severe loss of neurological function. Although syringomyelia is frequently associated with a concurrent Chiari malformation, it can occur in a variety of disease processes. Every year, 21,000 Americans are afflicted, with a prevalence of 8.4 cases per 100,000 people [(1)].To bring our comprehension of the mechanics together of cavitation in the spinal cord and the histological alterations that take place, Milhorat and associates created a disease Syringomyelia classification scheme based on enabling the interpretation of magnetic resonance imaging (MRI) & diagnosis, while offering recommendations for the best course of treatment mind [(2,3)]. Two factors are used to classify syringomyelia: cavity structure and aetiology (Types I–IV). Anatomically, a syrinx can be either non-communicating (isolated) or communicating with the fourth ventricle, frequently as a result of blockages such as Chiari Malformation-1 (CM-1). The most prevalent type is non-communicating and can be categorized as Type I (associated with obstruction of the foramen magnum, such as CM-1), Type II (idiopathic), or Type III (caused by spinal cord injuries) [(4-6)]. The disorder is frequently linked to Chiari malformation type 1 (CM-1), but it can also be brought on by a number of other conditions, including infectious infections, trauma, or spinal cord malignancies [(7)]. The size, location, and extent of the fluid-filled cavity influence the severity and kind of symptoms, but radicular discomfort, gait ataxia, sensory abnormalities, dysesthesias, motor weakness, spasticity, autonomic dysreflexia, and neuropathic pain are the most typical signs of syringomyelia [(8,9)].

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In order to diagnose syringomyelia, a high-resolution CT scan is used to evaluate the bony spinal canal and plain radiography series with dynamic images are essential procedures. An MRI scan is the most sensitive imaging technique for soft tissue [10]. The number of incidental syringomyelia findings has increased as a result of the availability of MRI. It has led to a rise in syringomyelia instances that are asymptomatic, which now account for 22.7% of cases. Improved MR quality enables imaging to show syrinx cavities prior to the onset of usual symptoms [11]. In certain circumstances, myelography is employed when MRI is not an option. There may be full subarachnoid block and cord widening. It is also possible to combine myelograms with both immediate and delayed high-resolution CT scans [12]. Treatment options may include endoscopic fenestration of a posterior fossa cyst or a cystic fourth ventricle [13]. Currently, the only effective treatment for syringomyelia is surgery. Craniocervical decompression is frequently advised for patients with CM-1[14]. The most used shunt technique is the syringo-subarachnoid shunt, followed by the syringo-peritoneal shunt [15]. Osseo-dural decompression of the posterior fossa and total release of obstruction at the foramen magnum and foramen of Magendie are the main surgical procedures [16,17].

## II. CASE REPORT

A 54 years old female patient had medical history which began 5 years back where the patient was working as an agricultural labour and occasionally carried heavy weights and one day fell. She developed back pain on which she approached a hospital, where they prescribed her with pain killer medication. She used this medication, but the pain was not relieved so she opted for the use of homeopathic mediation for 2-3 years but symptoms were still not relieved. Then she approached another hospital where she presented with the complaints of reeling sensation for 15 days, lower back ache for 1 year with bilateral lower limb pain associated with heaviness and difficulty in standing from sitting position in the last one year and knuckle pain which occurs occasionally. A physical examination was done and it revealed bilateral pitting oedema. On laboratory investigations the following where observed:

Table 1 Laboratory Investigation Results

| Investigation | Results | Normal Range |
|---|---|---|
| Haemoglobin | 11gm/dl | 12-15 gm/dl |
| MCV | 77fl | 83-101fl |
| MCH | 23.2pg | 27-32pg |
| MCHC | 30.1gm/dl | 31.5-34.5gm/dl |
| ESR | 58mm per hour | |

Upon radiodiagnosis MRI Lumbar Report showed a herniation of the bilateral cerebellar tonsils 7mm below the foramen magnum focal syrinx in the cervical spine at C6-C7 level. L3L4L5 disc desiccations diffuse annular bulges, causing thecal, sac indentation, bilateral neural foraminal narrowing with compression of both exiting nerve roots mild bilateral facet joint hypertrophy. Based on the clinical, physical and laboratory investigation the diagnosis is confirmed as “Syringomyelia”.

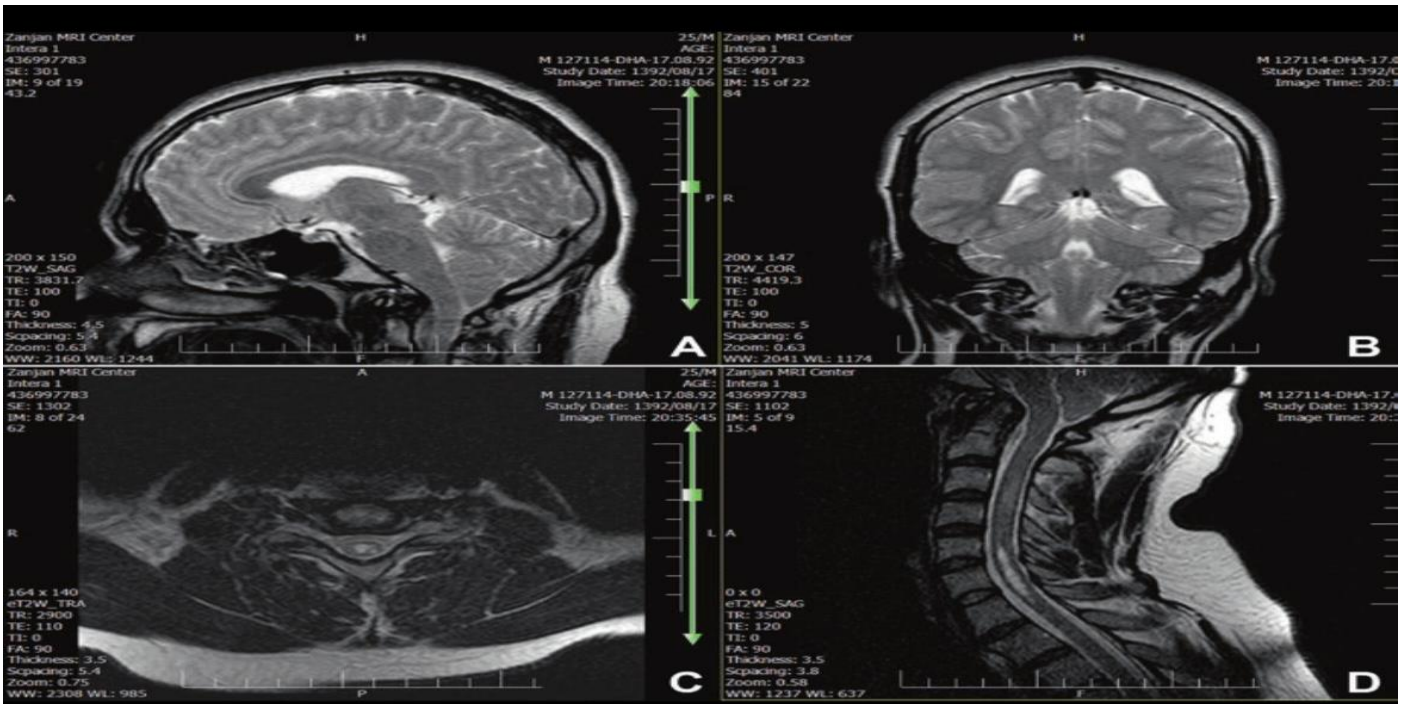

Fig 1 Magnetic Resonance Image (MRI) Showing Syrinx at the Cervical Spinal Cord at C6-C7 Level.

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➢ *The Patient was Prescribed with the Following Treatment:*

Table 2 Treatment Plan Given to the Patient

| Drug | Dose | Route of Administration | Frequency | Indications |
|---|---|---|---|---|
| T. Pantoprazole | 40mg | oral | 1-0-0 | Treats acid reflux |
| T. Gabapentin + Nortriptyline | 100/10mg | oral | 1-0-1 | Treats neuropathic pain |
| T. Methyl Cobalamin | 1500mcg | oral | 0-0-1 | Treats vitamin B12 deficiency |
| T. Calcium + Vitamin D3 | | oral | 0-1-0 | Calcium and vitamin supplement |

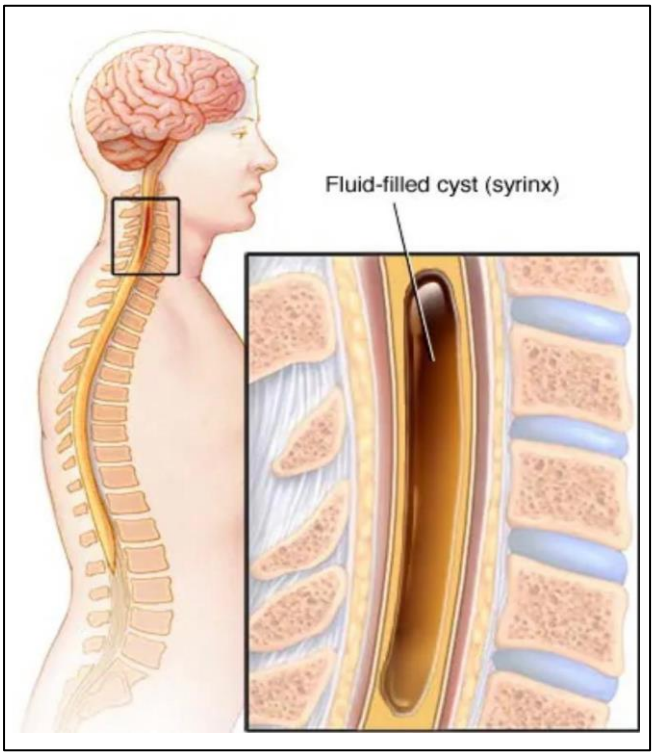


Fig 2 Syringomyelia Cyst (Syrinx)in the Spinal Cord

## III. DISCUSSION

The development of a fluid-filled cavity (syrinx) inside the spinal cord parenchyma is the hallmark of syringomyelia, a persistent neurological condition. The pathophysiology is complex and frequently linked to irregularities in the dynamics of the cerebrospinal fluid (CSF), which cause the spinal cord to gradually cavitate. Chiari type I malformation, in which normal CSF circulation is disrupted by the downward displacement of the cerebellar tonsils, is the most commonly documented cause of syringomyelia. Spinal cord tumours, trauma, infections, inflammatory processes, congenital defects such spina bifida, and idiopathic reasons are examples of other aetiologies [18].

As shown in the case the delayed post-traumatic syringomyelia, manifested as increased neurological deficits such as weakness, sensory abnormalities, and autonomic dysfunction, can even happen years after the initial spinal injury [19]. Furthermore, syringomyelia has been reported in families, which may indicate a genetic tendency in some cases [20].

The clinical manifestations of syringomyelia vary depending on the location, size, and extent of the syrinx. Patients frequently exhibit increasing neurological symptoms, including atrophy, muscle weakness, and segmental dissociated sensory loss (loss of pain and temperature with retained proprioception). In more severe situations, brainstem involvement may cause syringobulbia, which results in deficiencies in the cranial nerves [21].

However, asymptomatic syrinxes are becoming more frequently found by accident during imaging for unrelated illnesses due to the extensive use of MRI. The gold standard for diagnosis is still magnetic resonance imaging (MRI), which enables accurate syrinx visualization and the detection of related structural abnormalities. Since untreated syringomyelia can cause irreparable spinal cord damage and progressive neurological degeneration, early identification is crucial [22]. The accuracy and timing of neuroimaging are essential to the clinical therapy of syringomyelia. Early MRI imaging is still the gold standard for a conclusive diagnosis because it provides unmatched vision of the interior architecture of the spinal cord, even though physical investigations offer crucial semi logical information. Early detection of a syrinx, a longitudinal cavity filled with fluid, is crucial because it enables medical professionals to distinguish between idiopathic presentations and those resulting from trauma, Chiari malformations, or intramedullary malignancies.

Although pharmacological intervention is a mainstay of treatment, patient medication adherence is crucial to its effectiveness. According to our research, adherence is a result of successful patient education rather than just a question of willpower. The interruption of therapy continuity was a major problem in this instance. A significant gap in patient medication adherence is highlighted by the patient's choice to switch from traditional pharmaceutical management to homeopathic options for a duration of two to three years. Such a break in evidence-based treatment may cause refractory pain symptoms to persist or even worsen in complicated neurological disorders like Syringomyelia, where the management of neuropathic pain and syrinx development is time-sensitive.

The underlying cause and intensity of symptoms have a major role in management strategies. When neurological degeneration is progressing or a surgically treatable reason, such as a Chiari malformation or tethered cord, is found, surgical intervention is frequently advised. Restoring normal CSF flow and reducing syrinx size are the goals of procedures like posterior fossa decompression, arachnolysis, and shunting techniques.

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## IV. CONCLUSION

The results of this study highlight a crucial paradigm change in chronic care, where the foundation of functional recovery is the merging of early diagnosis and systematic neuro-rehabilitation. However, without a strong foundation for patient education, clinical treatments are insufficient on their own. According to our research, long-term patient medication adherence is positively correlated with doctors' prioritization of complete health literacy. In the end, patients are empowered to actively participate in their recovery process when prompt clinical identification and ongoing educational support are combined. Future healthcare models must go beyond discrete therapies in order to maximize therapeutic outcomes. Instead, they must create an atmosphere where patient-centred education and professional brilliance come together to guarantee long-term rehabilitation success. Neuro-rehabilitation's effectiveness is essentially time-dependent. According to our research, starting therapeutic exercises right away after an early diagnosis leads to noticeably better clinical results. The "neuroplasticity window," when the brain is most amenable to reconfiguration, is strengthened by this.

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