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# Very Early Detected Asymptomatic Posttraumatic Syrinx in a Patient with Spinal Cord Injury

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### **Authors' contributions**

*All authors read and approved the final manuscript.*

**Case Study**

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## ABSTRACT

**Aims:** Posttraumatic syringomyelia (PTS) is a devastating complication of spinal cord injury (SCI) because of its association with delayed neurological deterioration. In our case report, diagnosis of very early detected asymptomatic syrinx in a patient with incomplete SCI was made incidentally according to cervical spinal magnetic resonance imaging (MRI) performed for unrelated purposes 32 days after the injury and conservative management was considered with periodic spinal MRI and neurologic examination to monitor the progression of syrinx during four years follow up. The present case report is the first to define syrinx at a very early stage in a patient with traumatic incomplete SCI.

**Presentation of Case:** 19 year-old male patient sustained C4 and C5 linear vertebral lamina fractures and adjacent cord concussion due to a diving accident four years ago. On presentation at the rehabilitation unit, he was diagnosed as C5 American Spinal Cord Injury Association (ASIA) grade C tetraplegia according to his physical examination. On completion of the comprehensive rehabilitation programme, the patient showed gradual neurological improvement and was diagnosed as C5 ASIA D SCI. During four years of follow up syrinx had good prognosis by means of both clinical and radiologic findings. There were no symptoms or signs related to PTS, also periodic cervical spinal MRI performed annually showed no change in the size of syrinx.

**Conclusion:** We conclude that posttraumatic syrinx should be considered even in the

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earlier stages of the postinjury recovery period and syrinx which are particularly limited and asymptomatic could be followed up conservatively with close clinical and radiological observation.

*Keywords: Spinal cord injury; posttraumatic syrinx.*

## 1. INTRODUCTION

Posttraumatic syringomyelia (PTS) is a devastating complication of spinal cord injury (SCI) because of its association with delayed neurological deterioration [1-3]. In using the term "PTS", it is implied that the syrinx is progressively enlarging and might be symptomatic [4]. The clinical incidence of PTS has been reported to range between 0.3% and 3.2% in the SCI population [1,5]. However when radiological and autopsy findings are taken into consideration incidence appears to be higher than clinically demonstrated, reaching up to 22% [6,7]. In most spinal units, only those patients that become symptomatic are investigated with magnetic resonance imaging (MRI) and it is likely that there are many patients with asymptomatic syrinxes [8].

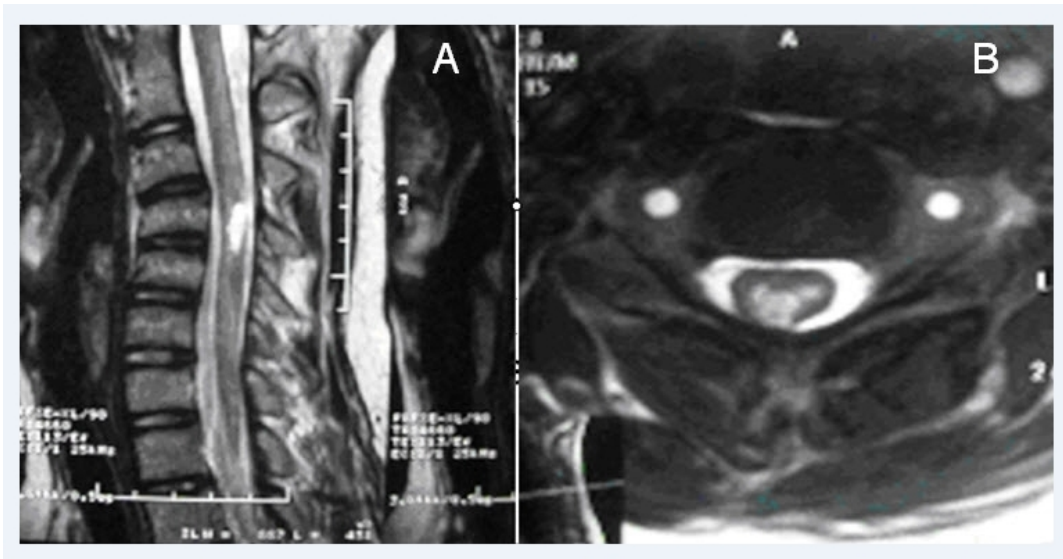
PTS is generally regarded as a late complication of SCI. However it should be considered even in the earlier stages of the postinjury recovery period [9]. The interval between spinal injury and syringomyelia is highly variable ranging from two months to several years [5,10]. PTS has been demonstrated as an incidental finding at autopsy within two months postinjury and also early onset of clinically detectable diagnosis of syrinx formation has been described in three cases respectively 75, 65 and 56 days after the SCI [9]. In our case report, very early detected asymptomatic syrinx in a patient with incomplete SCI was made incidentally according to MRI performed for unrelated purposes 32 days after the injury and conservative management was considered with periodic spinal MRI and neurologic examination to monitor the progression of syrinx during four years follow up. The present case report is the first to define a syrinx at a very early stage in a patient with traumatic incomplete SCI.

## 2. PRESENTATION OF CASE

19 year-old male patient sustained C4 and C5 linear vertebral lamina fractures and adjacent cord concussion due to a diving accident four years ago. On admission to our university hospital, neurologic examination of the patient showed motor weakness of bilateral hands and both legs, hypoesthesia below the level of C5. Examination of other systems revealed no abnormality. After treatment with high dose steroids and the traction of the vertebrae soon after the diagnosis of acute cervical SCI, he made remarkable neurologic recovery which encouraged neurosurgeons for conservative management of the spine. His cervical spine was stabilized with a Minerva brace and he was subsequently transferred to our rehabilitation unit 7 days postinjury.

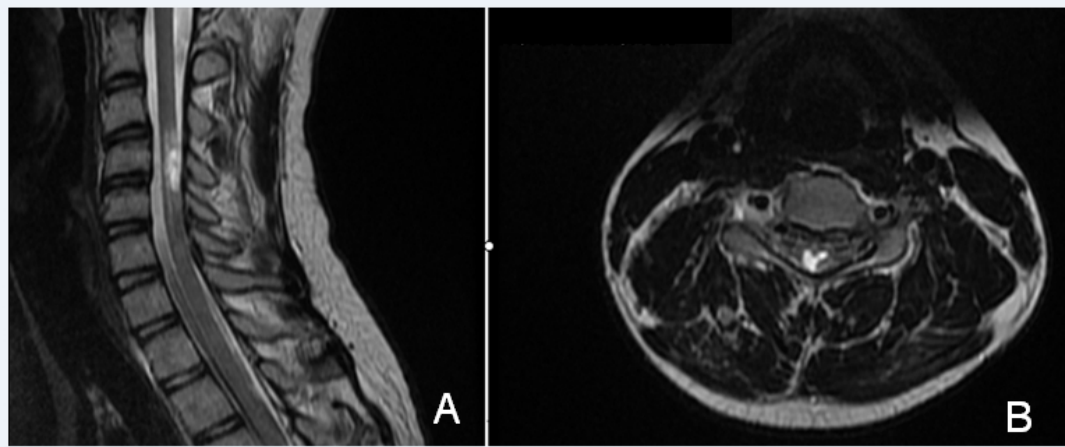
On presentation at the rehabilitation unit, he was diagnosed as C5 American Spinal Cord Injury Association (ASIA) grade C tetraplegia due to his physical examination. He was in a Minerva brace for cervical stabilization and was non-ambulatory using wheelchair for transportation. The patient was also dependent in activities of daily living including feeding, grooming, hygiene and dressing.

Comprehensive rehabilitation programme was started in our rehabilitation clinic. During the course of rehabilitation, cervical spinal MRI was performed to evaluate the stability of the injured spine. On this cervical MRI performed for unrelated purposes 32 days after the injury, he had syrinx diagnosed incidentally, although the patient had neurologic improvement rather than neurologic deterioration. MRI of the cervical spine with T2 weighted images demonstrated a cystic cavity within the spinal cord from C4 through the middle level of C5 vertebrae (Fig. 1). Conservative approach was considered for the treatment with periodic spinal MRI and neurologic examination to monitor the progression of syrinx, because the patient had improvement rather than neurologic deterioration with a limited and clinically asymptomatic syrinx. We advised our patient to avoid activities which can increase intramedullary pressure such as coughing, sneezing, straining or valsalva manoeuvres. The patient was allowed removing Minerva brace after three months from the initial trauma when the stability was maintained.



**Fig. 1. T2 weighted sagittal (A) and axial (B) views of cervical spinal magnetic resonance imaging 32 days after the spinal cord injury**

On completion of the rehabilitation programme, the patient showed gradual neurological improvement and was diagnosed as C5 ASIA D SCI. He was walking with a single-point cane independently and also was independent in all other daily living activities. Before discharge the patient was informed about the signs and symptoms of PTS and told to avoid activities which could increase spinal canal pressure. During four years of follow up the syrinx had good prognosis by means of both clinical and radiologic findings. There were no symptoms or signs related to PTS, also periodic cervical spinal MRI performed annually showed no change in the size of syrinx as well as his last cervical spinal MRI performed four years after the spinal injury (Fig. 2). In the subsequent four years his detailed neurologic examination was made quarterly by an expert physiatrist and revealed no neurological deterioration.



**Fig. 2. T2 weighted sagittal (A) and axial (B) views of cervical spinal magnetic resonance imaging four years after the spinal cord injury**

### **3. DISCUSSION**

The exact percentage of persons with initially asymptomatic syrinx cavities who become symptomatic is not known. Asymptomatic patients are diagnosed readily with MRI and likely to have smaller and shorter syringes than patients who are symptomatic [11]. It is of great importance to detect a progressive syrinx as early as possible since PTS is a major cause of secondary disability in the SCI population [8]. The interval between spinal injury and syringomyelia is highly variable ranging from two months to several years; however, mean time for the onset of PTS appears to have decreased in recent years [3]. Wozniewicz et al. presented multiple autopsy cases of syrinx formation within two months postinjury although none with clinical correlation [12]. In another report, there were three patients whose clinical symptoms related to PTS were detected as early as two months after the SCI [9]. To our knowledge, no patients with posttraumatic syrinx have been described earlier than two months postinjury in the literature. In this report we presented a remarkable case, incidentally diagnosed as asymptomatic syrinx according to MRI performed for unrelated purposes 32 days after the injury and prospectively followed up with conservative treatment for four years in a patient with incomplete SCI.

The mechanism of initial cyst formation and progressive enlargement are unknown although arachnoiditis and persisting cord compression with disturbance of cerebrospinal fluid flow appear to be important etiological factors [13]. Given the early start of the posttraumatic syrinx described in our case, which is a rare event in itself, and its successive stability during its development, whether there exists a relation between the traction of the vertebrae soon after the diagnosis of acute cervical SCI and the onset of syringomyelia is uncertain. The traction may lead tethering and pressure gradient in cerebrospinal fluid at the level of lesion in the early stage of SCI apparently with the spinal cord tissues still altered by the trauma. A better understanding of the causal mechanisms of syringomyelia is required to develop more effective therapy.

Progressive enlargement of posttraumatic syrinx cavities occurs in a small percentage of patients who have suffered a severe SCI in the past. The exact mechanisms that cause this enlargement and why such enlargement is found in some patients but not in others remain

uncertain. However, there are observations that could help in explaining the insidious progression of this posttraumatic complication, including the presence of scarring and adhesions within the subarachnoid space, alterations in cerebrospinal fluid flow dynamics, and fluid turbulence within the syrinx cavity itself. In a series of 20 PTS patients with SCI, it was reported that all patients showing a worsening of their neurological condition had pronounced cord compression, tense syrinx at the fracture site and kyphosis. Spine displacement and a narrowing of spinal canal appeared to be of importance as long as they were associated with cord compression. Also, a positive correlation was found between syrinx length and neurologic deterioration whereas the cyst diameter did not seem to be important [14]. Williams advocated prophylactic shunting of spinal cord cysts to prevent the development of irreversible symptoms [15]. However this recommendation may be tempered by the finding of Backe et al. [16] of a high rate of asymptomatic syrinx formation in patients with SCI.

In a retrospective study, four conservatively treated patients with small asymptomatic, non-progressive syringes were evaluated with spinal MRI to monitor the progression of syrinx. The syrinx extended over a mean of four segments in these asymptomatic patients. Surgical treatment was indicated in the remaining 24 patients with symptomatic and progressive syringomyelia [1]. In another retrospective review of 21 cases, only one patient with asymptomatic syrinx had been treated conservatively and reported no neurologic deterioration [17]. To our knowledge this is the first report, describing very early detected asymptomatic syrinx in a patient with incomplete SCI and prospective follow-up for four years with periodic cervical spinal MRI and neurologic examination to monitor the progression.

#### **4. CONCLUSION**

We conclude that posttraumatic syrinx should be considered even in the earlier stages of postinjury recovery period and that syrinx which are particularly limited and asymptomatic could be followed up conservatively with close clinical and radiological observation.

#### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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