Increased Detection Rate of Syringomyelia by Whole Spine Sagittal Magnetic Resonance Images: Based on the Data from Military Conscription of Korean Young Males

Chang Hyun Oh, MD,1,2 Myoung Seok Lee, MD1, Yeo Ju Kim, MD3, Seung Hwan Yoon, MD2, Hyeong-Chun Park, MD2, Chong Oon Park, MD2

1Seoul Regional Military Manpower Administration, Seoul, Korea
Departments of 2Neurosurgery, 3Radiology, Inha University Hospital, College of Medicine, Inha University, Incheon, Korea

Purpose: We compared the detection rate of syringomyelia according to the type of magnetic resonance (MR) images among the Korean military conscription.

Materials and Methods: Among the total of 238910 examinees (males aged 18 to 32 years old) from January 2008 to December 2011, the examinees with conventional single lesion MR images (cervical, thoracic, and lumbar) with and without whole spine sagittal T2-weighted MR images (WSST2I) totaled 1206 cases, and syringomyelia was observed in 24 cases. The detection rate of syringomyelia according to the MR protocol (the presence of WSST2I or not) was done through analysis by annually and the clinical characters of syringomyelia was reviewed.

Results: The estimated prevalence of syringomyelia was approximately 10.0 cases per 100000 people. The detection rate was increased annually when the WSST2I proportion was increased (from 3.4 to 14.9 cases per 100000 persons, r = 0.939, p = 0.018). Clinical character of syringomyelia was ambiguous with other spinal diseases. The most affected spinal level was C5 to C7 (83%), and most cases were non-communicating syringomyelia with benign central canal widening (79%).

Conclusion: Whole spine sagittal MR image is useful to detect coexisting spinal diseases such as syringomyelia, and most syringomyelia in young males was benign hydromyelia. A whole spine sagittal MR image is recommended to increase the detection of syringomyelia.

INTRODUCTION

Syringomyelia is a fluid-filled cavity within the spinal cord or brain stem (1-3). Predisposing factors include craniocervical junction abnormalities, spinal cord trauma, and spinal cord tumors (4, 5). Symptoms include flaccid weakness of the hands and arms and deficits in pain and temperature sensation in a capelike distribution over the back and neck; light touch and position sensation as well as vibration sensation are not affected (1, 6). Diagnosis is by magnetic resolution (MR) image. The estimated prevalence of the disease is roughly 8.4 cases per 100000 people in the United States, and no international geographic difference in the prevalence of syringomyelia is known (7). However, in the Korean conscription, the increasing tendency of syringomyelia detection was observed. So, the authors reviewed the change of syringomyelia detection rate during last 4 years, and reviewed the reason regarding the change in prevalence among males in the conscription for Korean military. Furthermore, the clinical character of syringomyelia in Korean young male was also reviewed.
Increased Syringomyelia Detection by Adding WSST2I

Korea has adopted the conscription system and all men are examined for the conscription. This survey was conducted at the Military Manpower Administration (MMA) in Seoul from January 2008 to December 2011. In this period, a total of 238910 examinees participated in the conscription, and the examinees with spinal (cervical/thoracic/lumbar) MR images totaled 1206 cases. MR images were reviewed and divided into 2 groups; group A with conventional regional MR images, which were not including whole spine sagittal T2-weighted MR images (WSST2I), and group B with conventional regional MR images including WSST2I or more than 2 regional MR images including cervical and lumbar regions.

The authors defined the syringomyelia as the lesion which has a well demarcated cavity, demonstrates a low signal on the T1 weighted image and increased signal on the T2 weighted image regarding the MR image, within the spinal cord without consideration in regards to expansion to the cord or the abnormal adjacent cord signal (Figs. 1-3). Syringomyelia was observed in 24 cases. For standardization of imaging protocols, all syringomyelia lesions detected by outside imaging were re-confirmed by a single 1.5T MR machine (Signa Excite, General Electronics Inc., Milwaukee, MI, USA) in Seoul Military Manpower Administration, as the original MR images were taken by multiple outside MMA-certified institutes using multiple MR machines. All images were reviewed by one neurosurgeon and one radiologist. Also, all medical certificates, which were brought by examinees, were review by one neurosurgeon. The authors devised the data by the level of syringomyelia, conscription year, checked MR images, and clinical presenting symptoms, cervical degenerative disc disease, syringomyelia type,
Table 1. Type of Spinal MR Images and Detection of Syringomyelia according to the Conscription Years

| Conscription Year | 2008 | 2009 | 2010 | 2011 | Total |
|-------------------|------|------|------|------|-------|
| Group A           |      |      |      |      |       |
| Only cervical regional MR | 13   | 14   | 19   | 23   | 69    |
| Only thoracic regional MR | 2    | 3    | 4    | 4    | 13    |
| Only lumbar regional MR | 249  | 223  | 239  | 247  | 958   |
| Group B           |      |      |      |      |       |
| More than 2 regional MR | 27   | 21   | 31   | 33   | 112   |
| Cervical MR with WSST2I | 0    | 3    | 5    | 11   | 19    |
| Thoracic MR with WSST2I | 0    | 0    | 2    | 2    | 4     |
| Lumbar MR with WSST2I | 0    | 5    | 9    | 17   | 31    |
| Total             | 291  | 269  | 309  | 337  | 1206  |
| Proportion of group B over total MR (%) | 9.3  | 10.8 | 15.2 | 18.7 | 13.8  |
| Syringomyelia cases | 2    | 4    | 9    | 9    | 24    |
| Total conscription cases | 59417 | 58895 | 60286 | 60312 | 238910 |
| Prevalence per 100000 person | 3.4  | 6.8  | 14.9 | 14.9 | 10.0  |

Note. — MR = magnetic resonance, WSST2I = whole spine sagittal T2-weighted MR images

Table 2. Syringomyelia Cases with Level of Syringomyelia, Conscription Year, Type of MR Images, Clinical Symptoms, and Combine Disease

| Case No | Age | Lesion Level | Conscription Year | MR Image Type | Neck Pain | Headache | Stiffness in Upper Tunk | Arm Weakness | Leg Weakness | Loss of Temperature | CDDD | Comment |
|---------|-----|--------------|-------------------|---------------|-----------|----------|------------------------|--------------|--------------|---------------------|------|---------|
| 1       | 23  | C2           | 2008              | C spine MRI   | Yes       | Yes      | No                     | No           | No           | No                  | Yes  |         |
| 2       | 29  | C5-C7        | 2008              | C spine MRI   | Yes       | No       | Yes                    | Yes          | No           | No                  | Yes  |         |
| 3       | 19  | C5-C6        | 2009              | C spine MRI   | Yes       | Yes      | Yes                    | No           | No           | No                  | Yes  |         |
| 4       | 24  | C5-C7        | 2009              | C spine MRI   | Yes       | Yes      | Yes                    | No           | No           | No                  | Yes  |         |
| 5       | 31  | C6-C7        | 2009              | C spine MRI   | Yes       | Yes      | Yes                    | No           | No           | No                  | Yes  |         |
| 6       | 23  | C4-T9        | 2009              | WSST2I + C spine MRI | Yes | Yes | Yes | Yes | No | Yes | Yes |         |
| 7       | 20  | C3-C4        | 2010              | C spine MRI   | Yes       | Yes      | No                     | No           | No           | No                  | Yes  | Block vertebral malformation |
| 8       | 23  | C4-C6        | 2010              | C spine MRI   | Yes       | Yes      | Yes                    | No           | No           | No                  | Yes  |         |
| 9       | 19  | C5-C7        | 2010              | C spine MRI   | Yes       | Yes      | Yes                    | Yes          | No           | No                  | Yes  |         |
| 10      | 27  | C5-C7        | 2010              | C spine MRI   | Yes       | No       | Yes                    | No           | No           | No                  | Yes  |         |
| 11      | 21  | C6-C7        | 2010              | C spine MRI   | Yes       | No       | Yes                    | Yes          | Yes          | Yes                  | Yes  | Chiari malformation |
| 12      | 32  | C6           | 2010              | Whole spine MR | No     | Yes | No | No | Yes | No | Yes | Scoliosis |
| 13      | 19  | C6-C7        | 2010              | WSST2I + L spine MR | Yes | Yes | No | No | No | Yes |         |
| 14      | 20  | C6           | 2010              | WSST2I + L spine MR | Yes | Yes | Yes | No | No | No | Yes |         |
| 15      | 24  | T2-T4        | 2010              | WSST2I + L spine MR | Yes | No | No | No | Yes | No | Yes |         |
| 16      | 25  | C1-T2        | 2011              | C spine MRI   | Yes       | Yes      | Yes                    | Yes          | Yes          | Yes                  | Yes  |         |
| 17      | 23  | C5           | 2011              | C spine MRI   | Yes       | Yes      | Yes                    | No           | No           | No                  | Yes  |         |
| 18      | 20  | C6           | 2011              | C spine MRI   | Yes       | Yes      | Yes                    | No           | No           | No                  | Yes  |         |
| 19      | 28  | C5-C7        | 2011              | C spine MRI   | Yes       | Yes      | Yes                    | No           | No           | No                  | Yes  |         |
| 20      | 19  | T4           | 2011              | C spine + L spine MR | Yes | No | No | No | No | No |         |
| 21      | 19  | C6-C7        | 2011              | WSST2I + C spine MR | Yes | Yes | Yes | Yes | No | Yes | Chiari malformation |
| 22      | 22  | C5-T2        | 2011              | WSST2I + L spine MR | Yes | No | No | No | Yes | No | Yes |         |
| 23      | 21  | C2-T2, T5-T7 | 2011              | WSST2I + C spine MR | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Chiari malformation |
| 24      | 24  | C7-T2        | 2011              | WSST2I + C spine MR | Yes | Yes | Yes | Yes | Yes | Yes | Yes |         |

Note. — CDDD = cervical degenerative disc disease, MR = magnetic resonance, WSST2I = whole spine sagittal T2-weighted MR images
benign central canal widening, and the enlarged 4th ventricle.

The statistical analysis was performed using Statistical Analysis System (SAS) (version 9.1.3, SAS Institute, Inc., Cary, NC, USA) with Pearson product-moment correlation coefficient, and considered significant at p-values less than 0.05. This study was conducted with the approval of the committee in the Military Manpower Administration in Seoul.

RESULTS

Among the 1206 cases regarding the study population having spinal MR images, 69 cases have only cervical regional MR images, 13 cases only thoracic regional MR images, 958 cases only lumbar regional MR, 112 cases more than 2 regional MR images, an 19 cases having cervical MR with WSST2I, 4 cases thoracic regional MR with WSST2I and 31 cases having lumbar regional MR images with WSST2I (Table 1). Magnetic resolution images were divided into 2 groups; group A as conventional regional MR images without WSST2I, and group B as conventional regional MR images with WSST2I or conventional regional MR images including more than 2 regions, and the proportion of group B according to the conscription years were shown in Table 1. The proportion (group B / group A + B) was 9.3 in 2008, but it progressively increased by the year, and finally reached 18.7 until December 2011.

Those diagnosed with syringomyelia during conscription totaled 24 cases (Tables 1-3). Two cases in 2008, 4 cases in 2009, 9 cases in 2010, and 9 cases of syringomyelia in 2011 were diagnosed. The detection rate of syringomyelia was approximately 1.4% (12 cases among 822 cases) in conventional MR images without WSST2I, but the rate was increased to 6.0% (10 cases among 166 cases) with WSST2I or more than 2 regional MR images. The overall estimated prevalence of syringomyelia was 10.0 cases per 100000 people, but annually the prevalence was increased from 3.4 to 14.9 cases per 100000 people during the last 4 years (Table 1). The relation between the annual propor-

Table 3. Syringomyelia Cases with Level of Syringomyelia, Syringomyelia Type, Central Canal Widening and 4th Ventricle

| Case No | Age | Level of Syringomyelia | Type of Syringomyelia | Benign Central Canal Widening | Enlarged 4th Ventricle |
|---------|-----|------------------------|-----------------------|-------------------------------|------------------------|
| C1      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| C2      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| C3      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| C4      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| C5      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| C6      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| C7      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| T1      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| T2      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| T3      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| T4      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| T5      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| T6      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| T7      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| T8      |     | S                      | Non-communicating     | Yes                           | Yes                    |
| T9      |     | S                      | Non-communicating     | Yes                           | Yes                    |
entire length of the spinal cord. In this study, 83% of syringomyelia was observed at the levels from C5 to C7, but the syrinx location was widely distributed from C2 to T9. The end result of hydromyelia and syringomyelia is essentially the same: an abnormal cyst having a collection of fluid in the spinal cord that is associated with a wide range of neurological complaints and signs. In this study, the most common neurological complaints were neck pain and headache. The weakness of extremities was observed in 17–33%, and the loss of the ability to feel extremes of hot or cold (17%). Each examinee experienced a different combination of symptoms. These symptoms might vary depending on the extent and the location of the syrinx within the spinal cord, the correlation between the symptom and these variations were not studied in this study. Twenty two cases among a total of 24 cases (92%) were checked for cervical multiple degenerative disc change in MRI, and the compressive disc protrusion/extrusion without myelomalacia was seen in 8 cases (33%). Among 24 cases, 20 cases (83%) observed syringomyelia at spinal levels from C5 to C7. Twenty two cases (92%) were non-communicating syringomyelia, belonging to central canal dilatations or primary parenchymal cavitations by the classification of Milhorat (8). Nineteen cases (79%) belonged to benign central canal widening, and 4th ventricle enlargement was observed in only 5 cases (21%). A case was observed block vertebrae’s in C4/5 and C6/7, and scoliosis was observed in one case with approximately 23 degrees of Cobb’s angle. And, three cases observed Chiari malformation type I.

**DISCUSSION**

Hydromyelia is a condition characterized by the widening of the central canal regarding the spinal cord. Fluid can accumulate in this space, creating increased pressure on the spinal cord. The term hydromyelia is sometimes used interchangeably with a closely related condition, syringomyelia. Syringomyelia is a condition in which fluid collects in the area of the spinal cord that is outside the central canal. Syringomyelia is a condition which fluid collects in the area of the spinal cord that is outside the central canal. Syringomyelia is a paramedian, usually irregular, longitudinal cavity. For simplicity, the term syringomyelia is used to refer to a fluid-filled cyst in the spinal cord that is inside or outside of the central canal. It commonly begins in the cervical area but may extend downward along the entire length of the spinal cord. In this study, 83% of syringomyelia was observed at the levels from C5 to C7, but the syrinx location was widely distributed from C2 to T9. The end result of hydromyelia and syringomyelia is essentially the same: an abnormal cyst having a collection of fluid in the spinal cord that is associated with a wide range of neurological complaints and signs. In this study, the most common neurological complaints were neck pain and headache. The weakness of extremities was observed in 17–33%, and the loss of the ability to feel extremes of hot or cold, the noteworthy symptom of syringomyelia, was observed in only 17%.

Syringomyelia usually results from lesions that partially obstruct the flow of cerebrospinal fluid (9-11). This result showed that the lesions usually involved the levels from C3 to C5 (83%). Although few cases were related to Chiari malformation in this study, it was generally reported that at least half of syrinxes occur in patients with congenital abnormalities of the craniovertebral junction (e.g., herniation of cerebellar tissue into the spinal canal, called Chiari malformation), brain (e.g., encephalocele), or spinal cord (e.g., myelomeningocele) (6, 12). For unknown reasons, these congenital abnormalities often expand during ones teens or young adult years, as our result showed. A syringomyelia can also develop in patients who have a spinal cord tumor, scarring due to previous spinal trauma, or no known predisposing factors (13-17). Although no case was presented in this

---

**Fig. 4.** The relation between the annual proportion (group B / group A + B) and the annual prevalence of syringomyelia according to the conscription year. Group A is conventional regional magnetic resonance (MR) images without whole spine sagittal T2-weighted MR images (WSST2I), and group B is conventional regional MR images with WSST2I or conventional regional MR including both the cervical and lumbar spine region.
Increased Syringomyelia Detection by Adding WSST2I

The clinical use of the WSST2I technique was first reported in 2001 for the evaluation of spinal scoliosis (22, 23). The necessity of WSST2I has been advocated for the precise diagnosis and proper treatment of specific spinal diseases (24-27). However, its routine use for the diagnosis of spinal diseases is controversial because it is seen as unnecessary and expensive requiring long scanning time for at least two different MRI studies: cervicothoracic and thoracolumbar scans. Recently, the development of coil systems for whole spine and image recombination software allowed whole spine sagittal images to be obtained more conveniently (28). In some reports, WSST2I is useful for diagnosing coexisting spinal diseases and to avoid missing a significant cord-compressing lesion in spinal diseases (29, 30).

In this study, WSST2I is also useful for detecting coexisting spinal diseases such as syringomyelia. In conclusion, in young Korean males, non-communicating benign hydromyelia is the most common type of syringomyelia. The symptom of syringomyelia was not specific, so it could be overlooked. But, the detection rate of syringomyelia has increased with the use of WSST2I in Korean young males. WSST2I is useful for detecting coexisting syringomyelia in various spinal diseases. So, WSST2I is recommended for the detection of syringomyelia.

REFERENCES

1. Barnett HJ, Botterell EH, Jousse AT, Wynn-Jones M. Progressive myelopathy as a sequel to traumatic paraplegia. Brain 1966;89:159-174
2. Bastian HC. On a Case of Concussion-Lesion, with extensive secondary degenerations of the Spinal Cord, followed by General Muscular Atrophy. Med Chir Trans 1867;50: 499-542.1
3. Phillips WA, Hensinger RN, Kling TF Jr. Management of scoliosis due to syringomyelia in childhood and adolescence. J Pediatr Orthop 1990;10:351-354
4. Williams B. Pathogenesis of post-traumatic syringomyelia. Br J Neurosurg 1992;6:517-520
5. Williams B, Terry AF, Jones F, McSweeney T. Syringomyelia as a sequel to traumatic paraplegia. Paraplegia 1981;19: 67-80
6. Umbach I, Heiporn A. Review article: post-spinal cord injury syringomyelia. Paraplegia 1991;29:219-221
7. Heiss JD, Oldfield EH. Pathophysiology and treatment of syringomyelia. Contemp Neurosurg 2003;25:1-8
8. Milhorat TH. Classification of syringomyelia. Neurosurg Focus 2000;8:E1
9. Byun MS, Shin JJ, Hwang YS, Park SK. Decompressive surgery in a patient with posttraumatic syringomyelia. J Korean Neurosurg Soc 2010;47:228-231

Symptoms usually begin insidiously between adolescence and age 45 (18, 19). Syringomyelia develops in the center of the spinal cord, causing a central cord syndrome. But, as in this study, most of syringomyelia did not present specific symptoms, so it was labeled benign central canal widening (20). Pain and temperature sensory deficits occur early but may not be recognized for years. The first abnormality recognized may be a painless burn or cut. In some cases, syringomyelia typically causes weakness, atrophy, and often fasciculations and hyporeflexia of the hands and arms; a deficit in pain and temperature sensation in a capelike distribution over the shoulders, arms and back is characteristic (4). Light touch, position and vibration sensation are not affected. Later, spastic leg weakness develops. Deficits may be asymmetric.

Etiology of syringomyelia is unclear. One study reported that the estimated prevalence of the disease is about 8.4 cases per 100000 people in United States, and no international geographic difference in the prevalence of syringomyelia is known (7). But, aside from this study, there was no satisfied prevalence study in the literature. In the autopsy data, 175 cadavers with syringomyelia were reported for 39 years (8). The nationwide epidemiological survey in Japan, totaling 1243 cases of syringomyelia was ascertained for 2 years (21). In this study, 24 syringomyelia cases regarding young males was reported and the overall estimated prevalence among young adults is 10.0 cases per 100000 persons. This prevalence was similar to the result of a previous report (7). However, the annually prevalence increased as observed in this study (Table 1, Fig. 4). Moreover, this increase was statistically significantly correlated with the increased proportion of the type of WSST2I (Fig. 4). WSST2I or more than 2 regional MR images encouraged the detection of incidental syringomyelia.

The clinical use of the WSST2I technique was first reported in 2001 for the evaluation of spinal scoliosis (22, 23). The necessity of WSST2I has been advocated for the precise diagnosis and proper treatment of specific spinal diseases (24-27). However, its routine use for the diagnosis of spinal diseases is controversial because it is seen as unnecessary and expensive requiring long scanning time for at least two different MRI studies: cervicothoracic and thoracolumbar scans. Recently, the development of coil systems for whole spine and image recombination software allowed whole spine sagittal images to be obtained more conveniently (28). In some reports, WSST2I is useful for diagnosing coexisting spinal diseases and to avoid missing a significant cord-compressing lesion in spinal diseases (29, 30). In this study, WSST2I is also useful for detecting coexisting spinal diseases such as syringomyelia.

In conclusion, in young Korean males, non-communicating benign hydromyelia is the most common type of syringomyelia. The symptom of syringomyelia was not specific, so it could be overlooked. But, the detection rate of syringomyelia has increased with the use of WSST2I in Korean young males. WSST2I is useful for detecting coexisting syringomyelia in various spinal diseases. So, WSST2I is recommended for the detection of syringomyelia.

REFERENCES

1. Barnett HJ, Botterell EH, Jousse AT, Wynn-Jones M. Progressive myelopathy as a sequel to traumatic paraplegia. Brain 1966;89:159-174
2. Bastian HC. On a Case of Concussion-Lesion, with extensive secondary degenerations of the Spinal Cord, followed by General Muscular Atrophy. Med Chir Trans 1867;50: 499-542.1
3. Phillips WA, Hensinger RN, Kling TF Jr. Management of scoliosis due to syringomyelia in childhood and adolescence. J Pediatr Orthop 1990;10:351-354
4. Williams B. Pathogenesis of post-traumatic syringomyelia. Br J Neurosurg 1992;6:517-520
5. Williams B, Terry AF, Jones F, McSweeney T. Syringomyelia as a sequel to traumatic paraplegia. Paraplegia 1981;19: 67-80
6. Umbach I, Heiporn A. Review article: post-spinal cord injury syringomyelia. Paraplegia 1991;29:219-221
7. Heiss JD, Oldfield EH. Pathophysiology and treatment of syringomyelia. Contemp Neurosurg 2003;25:1-8
8. Milhorat TH. Classification of syringomyelia. Neurosurg Focus 2000;8:E1
9. Byun MS, Shin JJ, Hwang YS, Park SK. Decompressive surgery in a patient with posttraumatic syringomyelia. J Korean Neurosurg Soc 2010;47:228-231

study, roughly 30% of people with a spinal cord tumor eventually develop a syringomyelia (18).

Symptoms usually begin insidiously between adolescence and age 45 (18, 19). Syringomyelia develops in the center of the spinal cord, causing a central cord syndrome. But, as in this study, most of syringomyelia did not present specific symptoms, so it was labeled benign central canal widening (20). Pain and temperature sensory deficits occur early but may not be recognized for years. The first abnormality recognized may be a painless burn or cut. In some cases, syringomyelia typically causes weakness, atrophy, and often fasciculations and hyporeflexia of the hands and arms; a deficit in pain and temperature sensation in a capelike distribution over the shoulders, arms and back is characteristic (4). Light touch, position and vibration sensation are not affected. Later, spastic leg weakness develops. Deficits may be asymmetric.
21. Moriwaka F, Tashiro K, Tachibana S, Yada K. [Epidemiology of syringomyelia in Japan—the nationwide survey]. Rinsho Shinkeigaku 1995;35:1395-1397

22. Schmitz A, Jaeger UE, Koenig R, Kandyba J, Wagner UA, Giesecke J, et al. A new MRI technique for imaging scoliosis in the sagittal plane. Eur Spine J 2001;10:114-117

23. Schmitz A, Kandyba J, Koenig R, Jaeger UE, Giesecke J, Schmitt O. A new method of MR total spine imaging for showing the brace effect in scoliosis. J Orthop Sci 2001;6:316-319

24. Althoff CE, Appel H, Rudwaleit M, Sieper J, Eshed I, Hamm B, et al. Whole-body MRI as a new screening tool for detecting axial and peripheral manifestations of spondyloarthritis. Ann Rheum Dis 2007;66:983-985

25. Green RA, Saifuddin A. Whole spine MRI in the assessment of acute vertebral body trauma. Skeletal Radiol 2004;33:129-135

26. Kaila R, Malhi AM, Mahmood B, Saifuddin A. The incidence of multiple level noncontiguous vertebral tuberculosis detected using whole spine MRI. J Spinal Disord Tech 2007;20:78-81

27. Ramachandran M, Tsirikos AI, Lee J, Saifuddin A. Whole-spine magnetic resonance imaging in patients with neurofibromatosis type 1 and spinal deformity. J Spinal Disord Tech 2007;20:78-81

28. Nakanishi K, Kobayashi M, Nakaguchi K, Kyakuno M, Hashimoto N, Onishi H, et al. Whole-body MRI for detecting metastatic bone tumor: diagnostic value of diffusion-weighted images. Magn Reson Med Sci 2007;6:147-155

29. Han IH, Suh SH, Kuh SU, Chin DK, Kim KS. Types and prevalence of coexisting spine lesions on whole spine sagittal MR images in surgical degenerative spinal diseases. Yonsei Med J 2010;51:414-420

30. Hanson EH, Mishra RK, Chang DS, Perkins TG, Bonfield DR, Tandy RD, et al. Sagittal whole-spine magnetic resonance imaging in 750 consecutive outpatients: accurate determination of the number of lumbar vertebral bodies. J Neurosurg Spine 2010;12:47-55
전척추 시상면 T2 강조 자기공명영상의 추가 촬영은 무증상 척수공동증의 발견율을 높일 수 있다: 징병검사자료 기반 연구

오창현1,2 · 이병석1 · 김여주3 · 윤승현2 · 박형천2 · 박종운2

목적: 전척추 시상면 T2 강조 자기공명영상(whole spine sagittal T2-weighted magnetic resonance images; 이하 WSST2I)의 추가 여부에 따른 척수공동증의 발견율 변화 여부를 징병검사 대상자 자료를 바탕으로 비교하였다.

대상과 방법: 서울지방병무청에서 2008년 1월부터 2011년 12월까지 징병검사를 받은 238910명 중 경추, 흉추 또는 요추 MR을 촬영한 자는 1206명이었으며, 척수공동증이 발견된 경우는 24명이었다. WSST2I의 촬영 여부에 따른 척수공동증의 발견율을 연도별로 비교하였으며, 이렇게 우연히 발견된 척수공동증의 임상적 특성을 기술하였다.

결과: 전체적인 척수공동증의 이환율은 10만 명당 10명이었다. 촬영연도가 최근일수록 WSST2I를 촬영한 비율이 증가하였으며, 이에 따라 척수공동증의 발견율도 연도가 최근일수록 증가하는 양상을 보였다 (10만 명당 3.4건에서 14.9건, \( p = 0.018 \)). 이렇게 우연히 발견된 척수공동증의 임상 증상은 다른 척수 질환에 비해 특이점이 없으며, 가장 많이 이환되는 부위는 경추 5~7번 높이 척수이고, 가장 많은 형태는 수두증이 없는 비교통성 양성 중심강 확장형 수척수증이었다.

결론: 전척추 시상면 T2 강조 자기공명영상의 추가 촬영은 무증상 척수공동증의 발견에 유용하다. 젊은 성인 남자에서 우연히 발견되는 척수공동증은 대부분 양성 수척수증이다.

1서울지방병무청 제1징병검사반, 인하대학교 의과대학 인하대병원 2신경외과, 3영상의학과