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Review Article

Role of MRI to Detection of Cervical Spondylotic Myelopathy in Diabetic Patients-Literature Review

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ABSTRACT

The most severe side effect of cervical spondylosis and the most frequent cause of spinal disorders older people is cervical spondylotic myelopathy (CSM). On T2-weighted images, increased signal intensity may be detected at the level of spinal canal stenosis, making MRI a helpful technique for examining the spinal cord. Disc degeneration leads to spondylotic alterations in the cervical spine of the elderly. Static/dynamic cord compression and microvascular insufficiency may result in acute spinal cord ischemia in CSM, which is followed by quickly progressing neurological impairment. The aim of study is to find out spondylotic myelopathy through magnetic resonance imaging. The data were included in literature review from several search engines. In this literature review, only 23 were used for extraction of data related to topic statement. It is concluded that MRI is used full technique for diagnosis, evaluation and follow-up of patients with spondylotic myelopathy.

INTRODUCTION

The most severe side effect of cervical spondylosis and the most frequent cause of spinal disorders older people is cervical spondylotic myelopathy (CSM). Clinical manifestations are primarily used to diagnose it. On T2-weighted images, increased signal intensity may be detected at the level of spinal canal stenosis, making MRI a helpful technique for examining the spinal cord [1]. Because, it can distinguish between neuronal, bone, and other tissue components with good resolution, MRI has shown a useful technique in describing the cervical spine anatomy. This technique makes it possible to see abnormalities in the spinal cord parenchyma like tumors, multiple sclerosis, and edema [2]. Disc degeneration leads to spondylotic alterations in the cervical spine of the elderly. Discs decompose, lose water, and collapse as they get older. The central annular lamellae buckle inward as a result of this process, which originates in the nucleus pulposus, while the annulus fibrosis's outer concentric bands bulge outward. Degenerative disc alterations have been seen in pathological samples from CSM patients [3]. Deep tendon reflex is still used today to determining the cervical myelopathy. The measurement of signal change and degree of compression using MRI is a crucial clinical diagnostic tool for general cervical disease. Additionally, a

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previous study found a significant relationship exists between preoperative neurological state and intramedullary signal intensity on cervical spine MRI with T2W-images and neurological prognosis. Therefore, in order to correctly determine the site in patients with neurologic impairment, clinicians must take into account both neurological and MRI findings [4]. The anterior cervical approach during surgery for degenerative compressive myelopathy can produce positive results and high fusion rates [5]. Since, diabetes mellitus (DM) is one of the most common comorbid disorders, individuals with diabetes now have more surgical choices. The peripheral nerve system and the microvascular system may be impacted by the chronic systemic disease known as DM. According to earlier authors, diabetic neuropathy and/or angiopathy affects how cervical spine procedures turn out [6]. Because DM typically involves peripheral nerves, autonomic nerves, cranial nerves, the spinal cord, and the brain, the potential of DM should be considered in the differential diagnosis of many neurologic illnesses. Due to DM's detrimental effects on the peripheral nerve and microvascular systems, it has recently attracted significant public attention in CSM patients who also have DM [7]. Magnetic resonance imaging (MRI) characteristics diagnostic of CSM, such as higher signal intensity of the spinal cord on T2-weighted imaging, are suggestive of poor neurological prognosis even after decompression [8]. The most frequent etiology of cervical myelopathy in adults 55 years of age and older has been identified as spondylosis [9]. Static/dynamic cord compression and microvascular insufficiency may result in acute spinal cord ischemia in CSM, which is followed by quickly progressing neurological impairment. Spinal ischemia requires prompt treatment since research suggests that speedy blood flow restoration may benefit patient outcomes [10].

METHODS

Search strategy: To find pertinent studies of spondylotic myelopathy, the databases of PubMed, NCBI, Medline, Medscape, and Google Scholar were searched. Selection standards: Only those articles that contained patients who had spondylotic myelopathy were included. Cervical myelopathy and patients with diabetes made up the bare minimum of essential information. Data extraction from complete journal articles was done. Data extraction was done from the 12 eligible studies that were included. Information was gathered from a variety of criteria, including author, publication year, spondylosis, degenerative changes, chronic wear, age, and comparable neurological illnesses.

RESULTS

Using the aforementioned keywords, 45 articles were located on 5 search engines and 5 others were located through other methods. Duplication led to the removal of seven duplicate articles. The necessary information was missing from ten out of ten articles. Three articles were giving forth insufficient information. Therefore, only 23 papers were ultimately used to gather information about cervical spondylotic myelopathy.

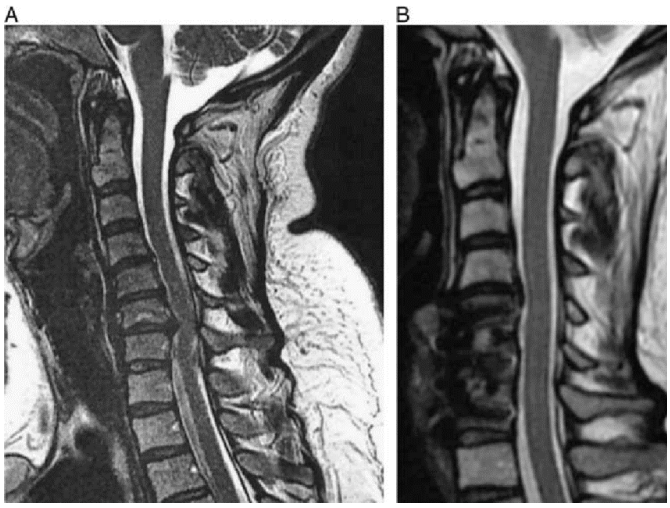

Figure 1: Magnetic resonance imaging of cervical spondylotic myelopathy patient before (A) and after (B) surgical intervention [11]

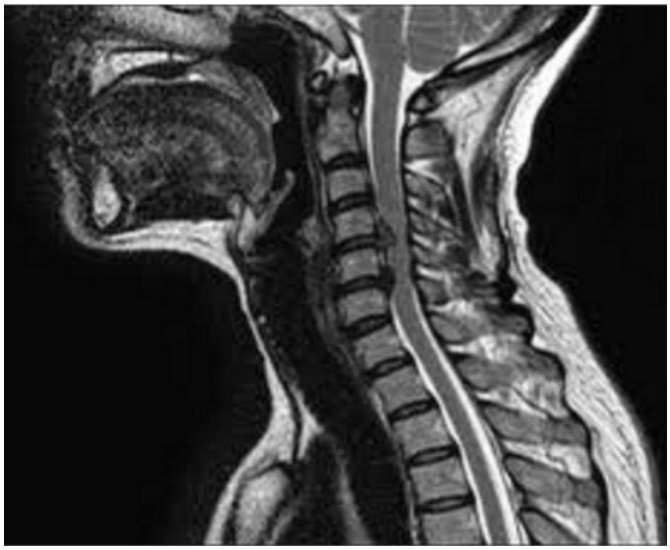

Figure 2: T2-weighted sagittal MRI demonstrating CSM with predominantly anterior compression due to soft disc herniation [12]

DISCUSSION

MRI is the gold standard imaging technique in such individuals and is considered a required investigation in CSM patients. MRI is superior to CT scan in all of the aforementioned aspects, including the ability to check discs, ligaments, the subarachnoid space, the spinal cord itself, and any extradural compression. However, it is sometimes constrained by the amount of time required for

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its development and the fact that certain patients experience claustrophobia. Since MRI has been made available in several centers during the past few years, this effect has been mitigated. Additionally, the most often employed sequences in clinical practice are T1 and T2-weighted images in both sagittal and axial planes [13]. Myelopathy patients needed more pinch pressure to grasp and hold small things, according to Smith *et al.*, According to these findings, damage to the cervical spinal cord's motor and sensory spinal tracts may contribute to hand dysfunction. According to these investigations, patients with cervical myelopathy and the related motor and sensory abnormalities, as seen by heightened reflexes and diminished proprioception, respectively, have been identified using neuromechanical measures [14]. Age is linked to postoperative problems, at least according to the literature currently available. This conclusion may be explained, in part that elderly patients are mostly to have significant degenerative disease and need complicated treatment [15]. Most investigations on the T2 (high) signal fall short of demonstrating a connection between the presence of a single-level T2 signal and patient function. Additional research demonstrates a link with function when T1 low signal is present, T2 high signal is present, the signal is present in many segments, or the signal improves postoperatively [14]. Clinically, we found the opposite to be true; in fact, in our series, the majority of our patients had some degree of deterioration with time, notably gait impairment. This is despite the fact that several studies show that symptoms of CSM tend to settle over time [16]. People with a developmentally narrow canal will experience milder spondylosis symptoms from CSM than people with a normal canal. Additionally, CSM secondary to a constricted canal often manifests earlier in life. Cassette studies have shown that women's canals are narrower than men's, and that older people's canals are noticeably narrower than those of younger people [17]. Some studies indicate that patients older than 65 with borderline medullary compression between C3 and C6 need to be evaluated with special care. A better understanding of the exact type and degree of the pathology may help informing the surgical decision-making process. Surgery is also indicated for CSM patients with moderate to severe symptoms [18]. Disruptions to upper extremity sensory function may be particularly concerning for prospective surgical candidates if our findings are confirmed. Bowel and/or bladder problems as well as irregular gait are particularly distressing symptoms in CSM patients. Long spinal cord tract involvement might cause gait problems [19]. Infarcts, demyelination, atrophy, and weakening of the posterior cord columns are just a few of the degenerative changes that diabetic patients' spinal cord and peripheral nerves experience over time. Further research including sizable cohorts of patients with cervical spondylitis myelopathy and diabetes is required to precisely define relationships between the severity of diabetes and surgical outcomes [20]. Although Diffusion Tensor Imaging (DTI) was found to be useful for assessing the disease severity of CSM patients before to surgery, it showed a low sensitivity for predicting postoperative neuronal recovery [21]. Susceptibility-weighted imaging, a technique used in MRI, has the potential to advance our understanding of the pathology of CSM beyond what is currently possible with existing MRI methods and speed up the process of creating accurate, quantifiable biomarkers for CSM that can be used in clinical settings [22]. A consistent pattern of lesion progression from mild spinal cord alteration to severe was seen in a neuropathologic investigation of CSM patients. On T1-weighted images, lesions with mild abnormalities, such as nerve cell loss, gliosis, gray matter edema, Wallerian degeneration, demyelination, and white matter edema, revealed nonspecific ISI without signal change [23]. In the adult population, the incidence of post-laminectomy kyphosis in the context of CSM is typically around 20% [24].

CONCLUSIONS

Magnetic resonance e imaging is a useful technique for the diagnosis, evaluation, and follow-up of patients with cervical spondylitis myelopathy. It is the standard treatment for cervical myelopathy since it is widely accessible. Additionally, late-stage multiple radiographic MRI findings are quite beneficial.

Authors Contribution

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All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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