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Original Article

A Prospective Observational Study of Clinical Profile of Patients with Cervical Myelopathy

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Abstract

Introduction: Cervical myelopathy (CM) is a commonly occurring ailment especially in advanced age. It carries vague clinical presentation and no definable natural history. 80% of people above 55 years of age have radiographic degenerative changes in the cervical spine. Asians are at increased risk. This observational study was undertaken to evaluate the clinical profile of patients of CM.

Materials and Methods: Forty consenting patients with features suggestive of CM were studied over 2 years. A detailed clinical examination especially neurological and investigations were carried out in each patient.

Results: In the present prospective observational study, 29 were male and 11 were female. Compressive etiology was found in 33 (82.5%) and non-compressive in 7 (17.5%) cases. Cervical spondylotic myelopathy 14 (35%) followed by trauma 7 (17.5%) were the commonest causes. Weakness (distal > proximal) of upper limbs was seen in 32.5%, lower limbs in 22.5%. 42.5% of patients complained of paresthesia of upper and or lower limbs. 30% of patients had urinary incontinence, 27.5% had positive Lhermitte's sign, 20% stiff gait, and 17.5% of patients had hand wasting. Impaired proprioception was seen in 15% of patients and hypoesthesia of hands in 12.5%.

Conclusion: Cervical spondylosis and trauma are two common causes of compressive myelopathy. Weakness and tingling and numbness were the most common symptoms. Lower cervical spinal cord bore the brunt of insult in both compressive and non-compressive cases.

Key words: Cervical, Compressive, Myelopathy, Non-compressive

INTRODUCTION

Acute or chronic neck pain has a prevalence of 10–20% in the adult population and may be a manifestation of cervical myelopathy (CM) secondary to compression or due to various inflammatory, degenerative and demyelinating disorders of spinal cord. The syndrome of degenerative cervical spondylotic myelopathy (CSM) was first described by Lord Brain. According to Lord Brain, 80% of people above 55 years of age have radiographic degenerative changes in the cervical spine which may or may not be symptomatic.[1] The incidence and prevalence of myelopathy due to degeneration of the spine are estimated at a minimum of 41 and 605 per million in North America, respectively. Incidence of CSM-related hospitalizations has been estimated at 4.04/100,000 person-years.[2] Asians are at increased risk (1.9–4.3% of individuals older than 30 years) due to their increased prevalence of ossification of the posterior longitudinal ligament.[3]

Compressive myelopathy may be caused by acute trauma, spinal cord tumors, degeneration of discs, osteophyte formation, granulomatous diseases, formation of syrinx, or congenital anomalies of vertebral spine and spinal cord. Degenerative CM (DCM) includes several disorders causing spinal cord impairment, including CM, degenerative disc disease, ossification of the posterior longitudinal ligament, and ligamentum flavum.[4] Non-compressive myelopathy (NCM) may be infectious, post-infectious, post-vaccinal, autoimmune, demyelinating, neoplastic, nutritional, paraneoplastic, and post-radiation in etiology. Other patient-specific factors, including

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smoking, participation in contact sports, and regular heavy load carrying on the head, may precipitate or aggravate the risk of development of myelopathy.

CM carries vague clinical presentation and no definable natural history. The patient may present with radicular pain, paresthesia, and muscle atrophy with or without long tract signs, spastic paraparesis, posterior column deficit, bladder and bowel symptoms or brain stem signs. The presentation and the course of illness may also be affected by comorbidities such as rheumatoid arthritis (RA) and movement disorders like Parkinson's disease or malignancy. The course of myelopathy may be short as in cases of trauma, secondary malignant deposits, post-infectious or post-vaccinal myelopathy, or long with period of non-progressive disability as due to DCM, autoimmune and demyelinating conditions. Myelopathy due to compressive etiologies is usually amenable to definitive treatment.

In view of protean symptomatology and signs of this rather common ailment, this study was conducted in a tertiary care teaching hospital in western India to evaluate the clinical profile of patients of CM.

Aim

This study aims to study the clinical profile of patients with CM.

MATERIALS AND METHODS

Forty consenting patients with features suggestive of CM were studied over 2 years. The patients were taken from tertiary care, multispecialty, teaching hospital in western Maharashtra. A detailed medical history was recorded and comprised of age, sex, occupation, socio-economic status, extramarital or premarital exposure, recent vaccination, and interval between onset of the first symptom and the time of presentation. History of trauma to head and neck, viral exanthem, diminished sensation of pain and hot and cold in the upper extremities, shooting pain in the arms, sensation of numbness and tingling, pain in the neck, sensation of coldness or weight in the upper limbs, weakness in the upper and lower extremities, wasting of upper and lower extremities, and impairment of sphincter control was obtained. A detailed systemic clinical examination especially neurological, was conducted in each patient. Cases were subjected to radiographic examination of the cervical spine. CSF study was carried out to establish the etiology where indicated.

OBSERVATIONS AND RESULTS

In the present prospective observational study, 29 were male and 11 were female; majority of the patients were male (29) and were in the age group 30–59 years (72.5%). The youngest patient was an 11-year-old with cervical trauma. The oldest patient was a 71-year-old-lady with atlantoaxial dislocation (AAD) secondary to RA. 23 patients were security personnel, 10 manual laborers, four students, and three were office workers. Three students and one office worker were female.

Etiology

Compressive etiology was found in 82.5%; non-compressive cause was seen in 17.5% cases. The commonest cause for compressive myelopathy was CSM (14 patients, 35%) followed by cervical fracture-dislocation (7 patients, 17.5%). Four (10%) patients had syringomyelia (SM), 3 (7.5%) intraspinal tumors (7.5%), and two (5%) each had tuberculosis of spine and atlantoaxial dislocation (AAD). One patient of AAD was a diagnosed case of RA for previous 20 years (Pie Diagram).

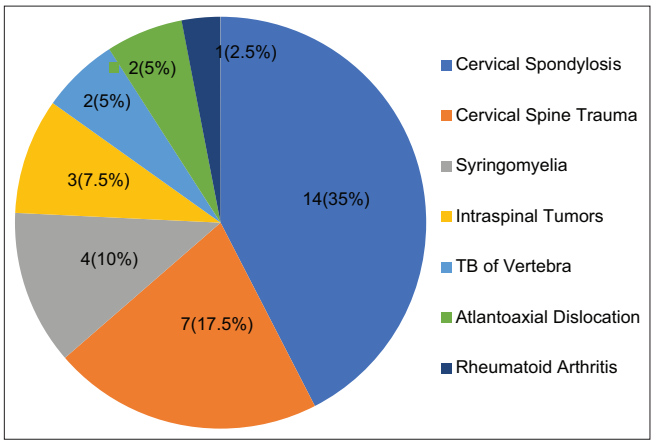
NCM was seen in only seven of 40 (17.5%) patients. Three patients had multiple sclerosis (relapsing-remitting), 2 post-viral myelitis, and 2 patients had AIDS with the AIDS dementia complex.

History of trauma to head and neck was forthcoming in all seven patients who had fracture/dislocation of the cervical spine. Trauma was also an important factor in cases of AAD and RA. The two patients of HIV/AIDS provided history of premarital sexual exposure. Two cases due to post-infective myelopathy gave history of viral exanthems preceding myelopathy. A history of relapsing and remitting neurological deficit was present in the three patients with demyelinating myelopathy.

Onset and course of illness ten cases had acute onset, seven <4 weeks, 20 patients had 1 to 7 weeks, and 3 patients had >6 months.

Symptoms [Table 1]

Tingling and numbness in the upper limb was observed as a symptom in 17 patients (42.5%). This was a common



Pie Diagram: Causes of Compressive Cervical Myelopathy

presenting complaint in patients with CSM (11 of the 14 patients). All three patients with multiple sclerosis had this complaint along with tingling and numbness in the lower limbs. One patient with SM and one each with post-infectious myelopathy and HIV had this complaint.

Weakness in the upper limbs was noticed in 13 patients (32.5%) which developed over a period of 2–6 months. Of these, four patients with SM presented with weakness of the small muscles. In three of these patients, weakness was present in only one hand and subsequently involved the muscles of forearm. Out of three patients with intraspinal tumors, two (1 ependymoma, 1 astrocytoma) had weakness in both the forearms. Two patients with tuberculosis of vertebra and five with cervical spondylosis had upper limb weakness. Weakness in the lower limbs was observed in 9 patients (22.5%). This was a presenting feature in the three patients with multiple sclerosis, four patients with cervical spondylosis and two patients with HIV/AIDS. Weakness involving both upper and lower limbs was seen in 18 patients (45%); 10 cases of cervical spondylosis, five cases of cervical spine trauma, two patients of AAD, and one patient of RA.

Impairment of sphincter control twelve patients had urinary incontinence (7 with spinal trauma, 2 with spinal tumors who developed incontinence later in the course of the disease). Two of the three patients with multiple sclerosis and one with HIV also had bladder involvement.

Pain in neck shooting pain in the neck on bending the neck forwards was observed as a symptom in 11 patients (7 with cervical spondylosis, 2 each with spinal tuberculosis, and multiple sclerosis). Dull aching pain in the nape vexing on movement of neck was seen in nine patients and was commonly at level of cervical C6/C7. Seven patients of these patients had cervical spondylosis and two had tuberculosis of the vertebra. Diminished sensation of hot and cold was a symptom in five patients (3 SM, 2 intramedullary tumors. The two patients of AIDS dementia complex gave history of generalized tonic-clonic seizures.

Stiffness of gait was noticed in eight patients. Out of these, five patients had cervical spondylosis, two intraspinal tumors and one patient had SM.

Wasting of the muscles of forearm and hand was seen in seven patients. These included four patients with SM (weakness and wasting of the small muscles of the hand), one with intraspinal tumor (wasting of the forearm muscles), and two patients with cervical spondylosis who also noticed a difference in the bulk of muscles on the two sides.

Clinical Examination [Table 2]

Optic nerve involvement was seen in two cases of multiple sclerosis and fifth cranial nerve involvement leading to diminished sensation of hot and cold over the lower half of face was seen in a case of syringobulbia.

Motor system muscle bulk was reduced in 13 patients in the upper limb. Of these, four patients with SM had gross wasting of the small muscles of the hand. The two patients with intraspinal tumors had reduced bulk of muscles in one forearm. Two patients with tuberculosis of the vertebra & five patients with cervical spondylosis had reduced bulk in the upper limbs. Hypotonia was a more common finding in the upper limbs compared to hypertonia.

Power was reduced in the upper extremity more than it was in the lower extremity. The distal group of muscles in the upper limb was affected more than the proximal group. In 14 patients, the reduced power, being Grade IV/V in the proximal group of muscles and Grade Ill/V in the distal group in the upper limb. Weakness was more pronounced in the lower limbs in patients with cervical fracture and AAD and in the patient with RA. Deep tendon jerks were

Table 1: Frequency of symptoms in cases of cervical myelopathy

Symptom	DCM	Trauma	SM	Tumor	TBS	AAD	MS	Misc.	Total
Weak- ness									
UL	5		4	2	2				13
LL	4						3	HIV-2	09
UL+LL	10	5				2		RA-1	18
Wasting UL	2		4	1					7
Stiff Gait	5		1	2					8
Incontinence		7		2			2	HIV-1	12
Paresthesia UL	11		1				3	HIV-1	17
								PIM-1	
Pain Nape	7				2				9

DCM: Degenerative cervical myelopathy, SM: Syringomyelia, TBS: Tuberculosis of spine, AAD: Atlanto-axial dislocation, MS: Multiple sclerosis, PIM: Post-infectious myelitis

Table 2: Neurological findings in cases of cervical myelopathy

Sign	DCM	Trauma	SM	Tumor	TBS	AAD	MS	Misc	Total
Wasting	5		4	2	2				13
Hypotonia UL	5		4	2	2				13
Hyper-tonia									
UL	5						1		6
LL	7					2			9
Weak-ness									
UL	7		3	2			2		14
LL		7				2		RA-1	10
Hypoasthesia			4	1					5
Priopioception	6				1	1			8
Lhermitte Sign	7				2		2		11

DCM: Degenerative cervical myelopathy, SM: Syringomyelia, TBS: Tuberculosis of spine, AAD: Atlanto-axial dislocation, MS: Multiple sclerosis, PIM: Post-infectious myelitis

exaggerated in all limbs in 8 patients in the upper limbs in 7 patients and in lower limbs in 8 patients. Spastic gait was observed in 14 patients.

Sensory system pain and temperature sensation were impaired in the four patients with SM. Of these, in two patients, the pain and temperature loss was over the C4 - C7 dermatome, in one patient, the involvement was over the C3 - C7 dermatome, and the fourth patient with syringobulbia had V cranial nerve involvement as well. Similarly, pain & temperature loss was seen in one patient with intramedullary tumor. Vibration and joint position sense was impaired in 6 patients of cervical spondylosis, and one each of spinal TB and AAD.

DISCUSSION

Age and Sex

The maximum number of cases (72.5%) were in the age group of 30–50 years. Similar results were found in a study by Faysal *et al.* wherein the mean age of CM was 35 ± 13.9 years (range 13–65 years).[5] This age group correlates well with the increasing incidence of CSM. CSM is the most common cause for spinal cord dysfunction in the more mature segment of the population.[6] CSM is responsible for hospitalization at the rate of 4.04 per 100,000 person-years. The incidence of cervical spondylosis increases with aging before 50 years of age. The incidence decreases with aging after age 50 years, especially in the elderly after 60 years.[5,7] On the contrary, younger age group is more often victim of traumatic spinal cord injury., In the study of 804 SCI patients by Güzelküçük *et al.*, the mean age at the time of injury was 32.58 ± 14.71 years (range: 4–79 years), and the largest age group was 16–30 years (n = 117, 48.3%), followed by 31–45 years (n = 70, 28.9%).[8]

There was overall male preponderance in our study (62% vs. 38%) if the composite diagnosis of CM was considered. Similar results were found in other studies as well.[5,9] CSM was more common among females. Spinal Trauma were seen more often among males. Traumatic spinal injuries are more common among males possibly due to being involved in vehicular accidents, falls, and sports.[8,10]

Occupation

CSM was seen more frequently in laborers who carried heavy loads on their heads and usually affected them at a younger age group. The two patients with HIV and CM were sailors who contracted the disease due to sexual promiscuity. There are contradictory findings in the literature regarding association of head-load carrying with development of cervical spondylosis. Some studies found positive association between the two, while others have reported a negative association.[10,11]

Compressive versus NCM 82.5% percent of the cases in the present study were due to a compressive etiology; of this CSM and cervical trauma constituted a large portion. SM, intraspinal tumors and tuberculosis of vertebra, in that order constituted the other causes of compressive myelopathy. Demyelination, post-infective & myelopathy due to AIDS constituted the non-compressive causes (17.5%). Compressive myelopathy has been found to be more common cause of myelopathy in other studies as well.[5,12] Tuberculosis, followed by CSM, tumors, and CV anomalies was found to be most common cause of compressive paraplegia by Chaurasia *et al.* in their series of 204 cases of non-traumatic myelopathy.[13]

Symptoms

Weakness in the upper limbs was noticed in 13 patients (32.5%) of compressive myelopathy, including all four patients with SM. Weakness in the lower limbs was noticed in 22.5% of patients. As found in our study, upper limb numbness, hand clumsiness, and distal weakness is a common sign of CM and CM without symptoms in the upper extremities is rare.[14]

Cervical pain was seen in nine patients (22.5%), predominantly in those with cervical spondylosis. Of these, four patients with lateral osteophytes had radicular pain. Neck pain is a very common symptom with an annual prevalence rate of 10-20%. Therefore, it is important to recognize the 'red-flag' symptoms requiring further evaluation. Focal weakness, Lhermitte's sign, neck pain associated with headache, visual disturbance, fever, or unexplained weight loss requires further evaluation.[15,16]

Tingling and numbness were seen in a large proportion of patients (42.5%), especially in the upper limbs in patients with CSM. This large percentage of patients with tingling and numbness represents subset of patients with predominantly central cord syndrome with severe motor and sensory disturbances, with greater expression in the upper extremities.[17] Lhermitte's sign was seen in 11 cases (27.5%). There is a large variation in the incidence of this symptom as reported in literature; various studies have reported its frequency from 9-41% in multiple sclerosis.[18,19] Lhermitte's sign was seen in high percentage of patients in the current study, probably because most of the patients with CSM had a central cord syndrome. Lhermitte's sign is not pathognomonic of multiple sclerosis; it can be seen in spinal cord compression from any cause, conditions including but limited to cervical spondylosis, trauma, SM, and Arnold-Chiari Malformation. It can also be seen in radiation myelopathy, Vitamin B12 Deficiency, cisplatin toxicity, SLE, and post-dural puncture headache.[20]

Wasting of the muscles was prominently observed as a symptom by three patients with SM, and one patient with

intraspinal tumor. Wasting of small muscles of hand can be seen in mid-cervical cord compression from any cause such as cervical spondylosis, SM, and RA.[21,22] Impairment of sphincter control was a prominent feature of patients with multiple sclerosis, fracture-dislocation, and HIV myelopathy. 22.72% had bladder sphincter disturbance in the study by Faysal *et al.*[5] Bladder or bowel dysfunction is an indicator of advanced disease and poor prognosis.[23]

Signs

Cranial nerve involvement was seen in three patients. Two patients of multiple sclerosis had optic nerve involvement. One patient with syringobulbia had loss of pain and temperature sensation over the lower part of the face. Spinal nucleus of the trigeminal nerve and cranial nerves XI and XII may be involved in upper cervical cord compression. Murahashi *et al.* in their study of 24 cases of CM at C1-C2 level, found a case of dysphagia due to glossopharyngeal nerve, vagal, and hypoglossal nerve dysfunction.[24]

Muscle wasting was recorded in 13 patients (32.5%) and was seen commonly in an asymmetrical distribution in the upper limb. This is to be expected considering the involvement of cervical spine. The weakness in the upper extremities was more pronounced in the distal group of muscles. We, in our study, did not find the "amyotrophic type of myopathic hand" wherein there is wasting of intrinsic and extrinsic muscles of hand but not accompanied by sensory loss or spastic quadriparesis.[25]

Thirteen out of 40 patients (32.5%) had sensory disturbance in our study. Pain and temperature sensation was impaired in four patients of SM and one patient of intramedullary tumors. Eight patients (20%) had impaired position and vibration sense. Out of these eight patients, six had cervical spondylosis and two were due to demyelinating illness. Similar findings were also reported by Yoshiyama *et al.*, who found "pseudo-neuropathic sensory loss including impaired pin-prick and vibration sense in 10 out of 61 patients.[26] On the contrary, higher frequency of sensory disturbance (60–70%) has been reported in other studies.[5,27] Prolonged central motor conduction time measured in Abductor halluces could be useful test for detection of CM in those without sensory disturbance of hands.[28]

SUMMARY

CM as a manifestation of spinal cord compression could be due to varied etiology. It could be due to compressive or non-compressive causes. It can present with radicular pains, paresthesia, and muscle atrophy with long tract signs, spastic paraparesis, posterior column deficit, bladder and bowel symptoms, or brain stem signs. Forty cases with features suggestive of CM were studied over 2 years. Most of the patients in the present study were in the age group of 30–59 years. Compressive myelopathy was the cause in 82.5% of these 40 patients. Of these, cervical spondylosis was the most important cause followed by cervical trauma. SM and intraspinal tumors came a close third and fourth as the cause, respectively. Multiple sclerosis, post-infective causes and HIV formed the non-compressive group.

CONCLUSION

CM is an important clinical entity because most of the patients belong to the most productive period of life. Cervical spondylosis and trauma are two common reasons for compressive myelopathy. Weakness and tingling and numbness are the most common symptoms. Lower cervical spinal cord bore the brunt of insult in both compressive and non-compressive cases. Compressive myelopathy is the ones where a definitive treatment can be offered.

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