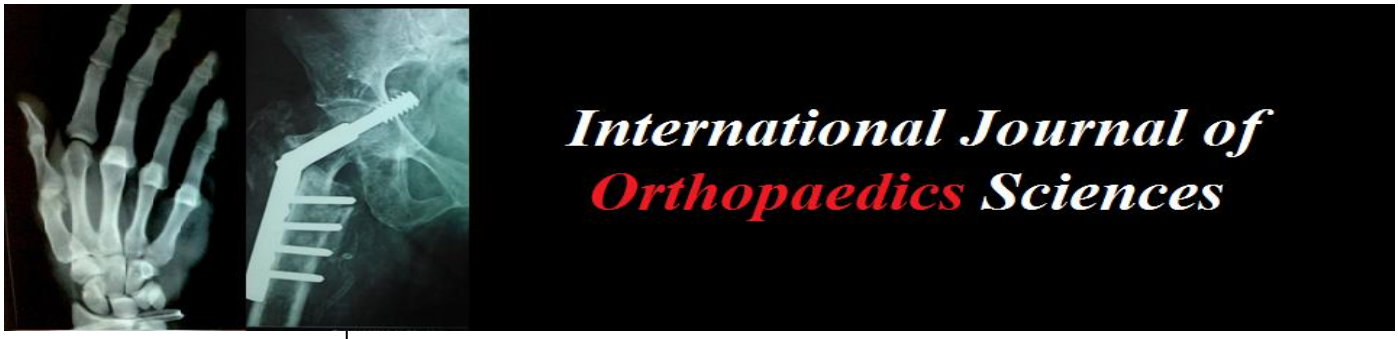

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Cervical degenerative myelopathy: Surgical results and factors affecting outcome with special reference to age of patient and duration of symptoms

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Abstract
Currently the global population is experiencing a shift in age structure with proportion of population over 60 years increasing and also with change in lifestyle the number of degenerative myelopathy cases is ever increasing. Cervical degenerative myelopathy is a progressive disabling disorder compelling the patient to be bedridden. It generally requires surgical intervention owing to its progressive nature. The primary goal of surgery is to decompress the spinal cord. This study is an effort to evaluate functional outcome following surgical decompression and factors affecting it.

Materials and Methods: 14 patients who presented with cervical degenerative myelopathy were included in the study that underwent decompressive surgery from June 2017 to December 2018. Each patient was graded according to Nurick grade. Pre and postoperative Nurick grade was compared along with age and duration of symptoms. Patients with associated orthopaedic comorbidities were excluded. The associated complications were recorded.

Results: Out of 14 cases, 11 cases was subjected to posterior decompressive surgery, ant. Dissectomy and fusion was done in 2 cases and ant. Corpectomy and fusion was done in 1 case according to definite indications. Preoperatively patients had a mean Nurick grade of 3.43 which was reduced to 1.86 postoperatively at 6 months ($p< 0.05$). Neurological recovery was seen in 93% of cases but the grade of improvement was dependent on age of the patient and duration of symptoms.

Conclusion: Surgical decompression is a rewarding procedure for compressive degenerative myelopathy with functional improvement in most patients. However the age and duration of the disease affects the functional outcome of the patient. We recommends that patients with compressive cervical myelopathy undergo surgical intervention as early as possible.

Keywords: Cervical degenerative myelopathy, Nurick score

Introduction

The understanding of disc degeneration has encountered tremendous change in recent years. At the same time the global population is witnessing a switch in its age structure. According to WHO the proportion of population over 60yrs of age is projected to be twice than that of 11% in 2010 to 22% in 2050.With the ageing of the population clinician worldwide would be required to oversee the ever increasing number of spinal disorders related to advanced age and change in lifestyle [1].

Cervical compressive degenerative myelopathy is a disabling disorder compelling the patient to be bedridden. It generally requires surgical treatment owing to its progressive nature[2]. It is slightly more common in men and is the most common cause of spinal cord dysfunction in older individuals. The pathogenesis begins with degenerative changes in the nucleus followed by annular degeneration. As the degeneration gradually proceeds there will instability of the segment or degenerative arthritic changes and eventually there will be invasion of the available space in the spinal canal and spinal cord by deformation of the facet and uncovertebral joints with associated osteophytes. Spinal stenosis results from intervertebral disc herniation, invagination of the ligamentum flavum into the canal and also due to bony overgrowth in early stabilization or late instability phase.

Clinical evaluation is very much important to diagnose a case of degenerative cervical compressive myelopathy which includes a history, physical exam, and radiographs.

MRI and/or myelography followed by CT scanning are the most convenient imaging studies for confirmation of diagnosis and surgical planning.

Patients with degenerative compressive myelopathy generally complain of neck pain, medial scapular pain, shoulder pain, gait disturbances, difficulty in doing fine movements like combing hair and unsteadiness of the feet. Pain radiating to arm, numbness in fingers, paresthesias, motor weakness are common complaints. There is generally coexisting compression of the nerve roots causing a radiculopathy of the nerve associated with it. Bladder dysfunction may occur but is not common. There can be also coexisting lumbar stenosis [4].

Most patients with symptomatic disc herniations generally respond well to conservative treatment, however in patients who are not improving with conservative treatment and those having increased or progressive neurological deficit should be operated at the earliest. The primary goal of surgery is to decompress the spinal cord and also to stabilize the region of the spinal column where there is myelopathy and instability. Main aim of decompression is to remove the spinal cord and root impingement with the least surgical risk and without disrupting the integrity of the spinal column.The model approach to disc in this region has been posteriorly with laminectomy. Currently anterior cervical dissectomy with fusion is the procedure of choice with good results[3, 15]. However the indications for anterior and posterior approach are specific.

This study is an effort to evaluate the functional outcome following surgical decompression in compressive degenerative myelopathy patients and factors affecting it with highlighting the age of patient and duration of symptoms.

Materials and Methods

This is a prospective study conducted from June 2016 to Jan 2019 in Assam Medical College, Dibrugarh. The patient that were included were 1) Age >18yrs 2) MRI showing evidence of compressive cervical myelopathy 3) Progressive neurologic symptoms. Patients that were excluded were 1) Asymptomatic 2) Previous cervical spine surgery 3) Associated with lumbar stenosis. All included patient underwent surgical decompression. Patients with <3 level of involvement underwent anterior decompression and fusion whereas posterior decompression was done in cases of multilevel involvement with maintenance of cervical lordosis. Pre-operative and postoperative nurick scale (Fig. 1) was compared. Patients were followed up at 1, 3,6,12 months and thereafter yearly.

Results

In total 14 patients were included in our study, of which 13 (93%) were male and 1(7%) female. The mean age of the cohort is 56yr. 11(79%) patients were below 65yrs and 3(21%) patients above. 13(93%) patients had improved nurick score postoperatively. Minimum of 2 grade improvement was seen in 8 cases out of 14 cases (58%). 5 cases had only single grade improvement, 4 of which either presented after 12 weeks duration or were more than 65yrs of age.1 case who had no improvement presented to us at 24 weeks. Statistically notable improvement was found at 3 months and reached its plateau at 6 months. The mean preoperative nurick score was 3.43 which improved to 1.86 postoperatively (Fig. 2) at 6 month followup.11 patient had undergone posterior decompression and lateral mass fixation (fig. 3) and rest anterior decompression of which anterior dissectomy and fusion (fig. 4, 5) was done in 2 cases and anterior corpectomy and fusion (fig. 6) was done in 1 case.

Table 1: Case records of Cervical Degenerative Myelopathy

Case	Age	Sex	Pre-Op Nurick Score	Post-Op Nurick Score At 6 Months	Approach	Duration In Weeks
1	50	M	3	1	Posterior	3
2	55	M	4	1	Posterior	4
3	45	M	3	1	Anterior	4
4	59	M	4	2	Posterior	6
5	55	M	3	2	Posterior	12
6	50	M	3	1	Posterior	8
7	49	M	3	1	Anterior	4
8	52	F	3	2	Posterior	4
9	55	M	3	1	Posterior	8
10	60	M	3	3	Posterior	24
11	70	M	4	3	Posterior	22
12	68	M	4	3	Posterior	6
13	50	M	4	2	Anterior	4
14	69	M	4	3	Posterior	6
Mean	56.21		3.43	1.86		8.21
SD	7.99		0.51	0.86		6.7

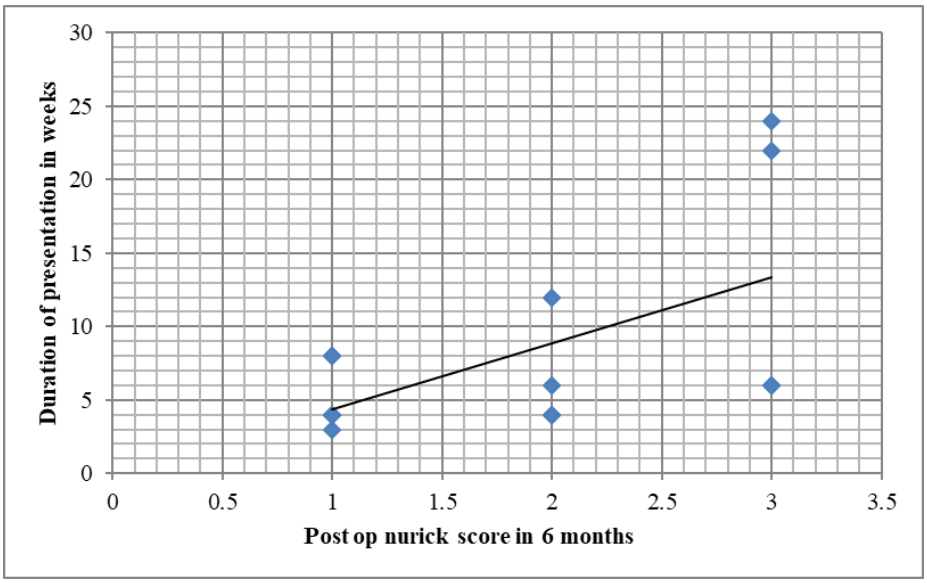
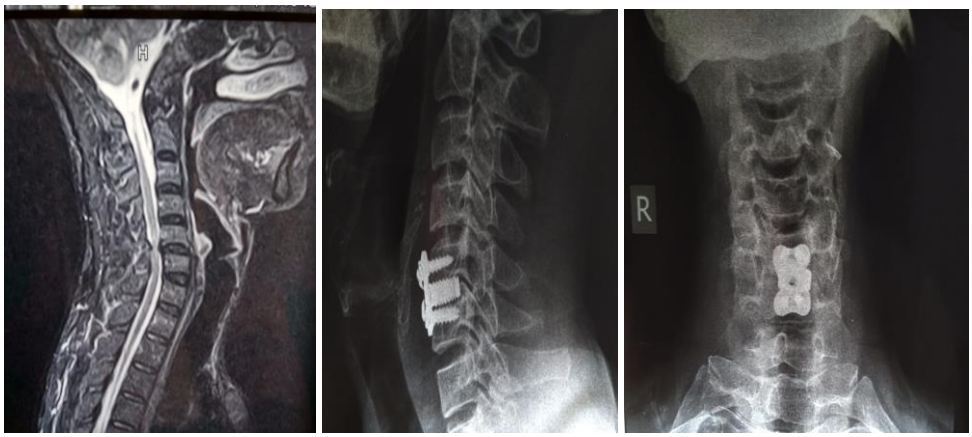


Fig 1: Scatter chart plotting duration of presentation vs post operative Nurick score

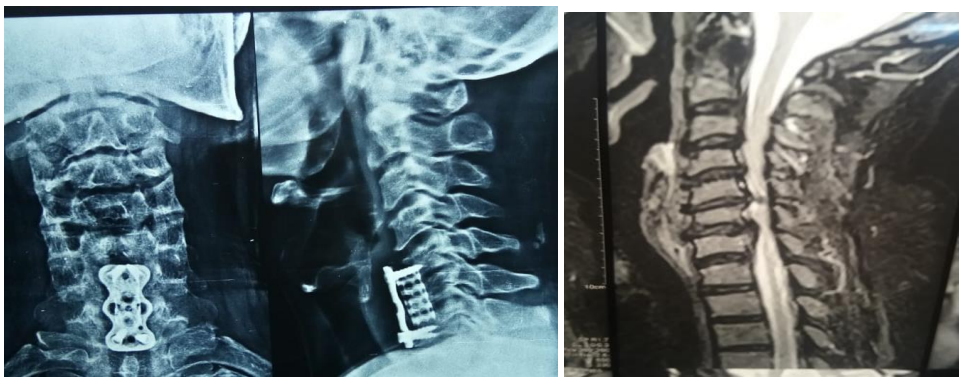
A **B** **C** **D**

Fig 2: Posterior Laminectomy and lateral mass fixation) **A, B =** Pre-**op C, D =** Post-op



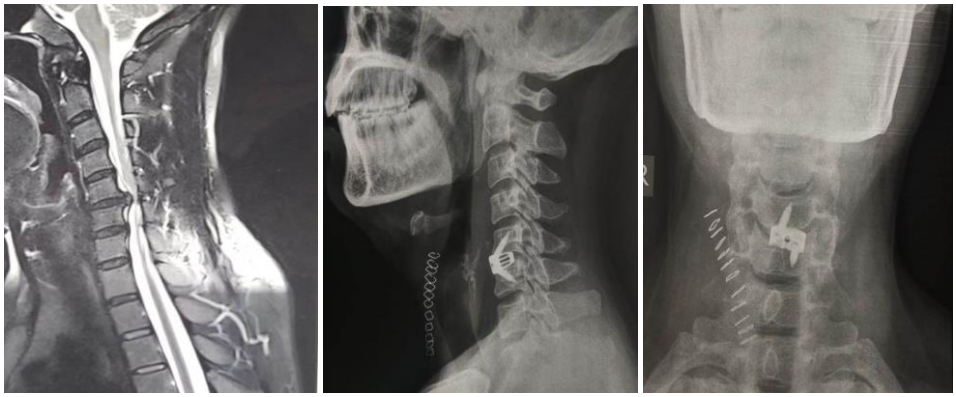
A **B** **C**

Fig 3: Anterior discectomy and fusion A = Pre-op B, C= Post-op



A **B**

Fig 4: Anterior corpectomy and fusion A = Pre-op B = Post-op



A. **B.** **C.**

Fig 5: anterior discectomy and fusion

0	Signs or symptoms of root involvement, but without evidence of spinal cord disease
1	Signs of spinal cord disease, but no difficulty in walking
2	Slight difficulty in walking but can get up from squatting or sitting on ground without vertical support
3	Difficulty in walking and requires vertical support to get up from squatting or sitting on ground
4	Able to walk only with someone else's help or with the aid of a frame
5	Chair-bound or bedridden

Fig 6: Nurick Scale

Discussion

Cervical degenerative compressive myelopathy is a progressive disabling disorder. With change in lifestyle and age structure we now encounter ever increasing number of such spinal disorders. Decompression can be performed by both anterior and posterior approach having their own specific indication as discussed earlier.

The suggested decompression is anterior when there is anterior compression at one or two level. For compression at more than two level posterior decompression is recommended and also compression due to ossification of posterior longitudinal ligament. However for posterior decompression to be effective cervical lordosis should be maintained otherwise it will lead to instability [4]. Fessler *et al*. [17] in their study reported that 92% of patients had symptomatic improvement after anterior decompression and fusion for cervical spondylotic myelopathy. However it was seen in their study that multi-level anterior decompression and fusion have complication as much as 60%. Dislodgement of bone graft is very common after multiple level corpectomies. Hence for multiple levels decompression posterior decompression has been favoured.

Posterior decompression can be done through both laminectomy and laminoplasty. In our cases we did laminectomy. Complications associated with this approach are postoperative hematoma, infection, deterioration of neurological status, late onset kyphosis [5, 14]. In our study we did not find any of the above mentioned complication but in one case we had screw back out postoperatively following lateral mass fixation but the patient improved neurologically as shown by improvement in Nurick grade. Late onset kyphosis can only be assessed after a long term follow up.

Presently the anterior approach is the procedure of choice for addressing degenerative disease of cervical spine. Two principle procedures have emerged – Anterior cervical dissectomy and fusion (ACDF) and Anterior cervical corpectomy and fusion (ACCF). Complications in this approach include oesophageal, neurovascular and tracheal damage, loosening of screws etc. [6, 7, 8, 13]. In our study ACDF was done in 3 cases and ACCF in 1 case, however we did not find any of the above mentioned complications may be due to small sample size.

Another important aspect of inadequate surgical decompression is very much important and may be one of the cause of non improvement post operatively, however there is very less study regarding the evidence of patient with myelopathy who have undergone a surgical decompression that was subsequently found to be in inadequate. However in a study done by Bhalla *et al.* they found that it was more common in anterior approach compared to posterior [9].

In a study by Chagas *et al*. [16] they treated fifty-one patients with cervical spondylotic myelopathy (CSM) by anterior cervical corpectomy with fusion (ACWF). Bulk of the patients, almost 80.6%, were satisfied with the final outcome. They concluded Anterior cervical corpectomy with fusion is a well grounded procedure having promising outcome for CSM, with functional improvement in most patients.

Cheung *et al.* found significant neurological recovery following surgical decompression in compressive myelopathy in 71% cases [10]. In our study 93% of the patients had neurological recovery following decompression. Sampath *et al.* compared conservative versus surgical treatment. The surgically treated patient had better neurological recovery [12]. In our study 13 (93%) patients had improved nurick score postoperatively

Various factors such as age at surgery, duration of myelopathy, MRI signal changes and the transverse area of spinal cord at the level of maximum compression have been reported to affect surgical outcome [11]. Prognostic factors for surgical treatment of cervical spondylotic myelopathy are still in dispute. Tomosato [18] and Fessler [17] found no difference in neurological recovery for patients aged below and above 65 years after surgical decompression. However, Yonenobu [19]showed that post-decompression the improvement of spinal cord function in the younger patients is superior as compared to that of older age group. Zheng *et al.* in their research found that advanced age, long term myelopathy symptoms are risk factors for poor outcome [2]. Similarly in our study we found that those who were >65yrs and those had increased duration of myelopathy neurological recovery was poor following decompression (Fig 2). In our study 5 cases out of 14 had only single grade improvement, 4 of which either presented after 12 weeks duration or were more than 65yrs of age. 1 case who had no improvement presented to us at 24 weeks. Limitations of study are small sample size and short follow up.

Conclusion

Surgical decompression is a rewarding procedure for compressive degenerative myelopathy with functional improvement in most patients. 93% cases had had neurological recovery postoperatively. However those cases who were >65yrs of age or those presented late to us (>12weeks) had poorer neurological. Thus the age of the patient and duration of the disease affects the functional outcome of the patient.

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