

## Outcome of Anterior Cervical Decompression and Fusion for Cervical Spondylotic Myelopathy

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### Abstract

**Introduction:** Anterior cervical discectomy and fusion (ACDF) is a common procedure for a patient with progressive spinal cord compression and severe neurological deterioration causing major disability. Surgery in anterior approach involves removal of osteophyte and disc materials for decompression of spinal cord with addition to the interposition of autogenous tricortical bone graft and stabilization by plate and screw.

**Objectives:** To assess the clinical outcome, complications of anterior cervical decompression and fusion for cervical spondylotic myelopathy.

**Materials and Methods:** This prospective interventional study was carried out in the Department of Orthopaedic Surgery, Combined Military Hospital, Dhaka from January 2015 to May 2017. Total of 24 cases of cervical spondylotic myelopathy was enrolled as a study sample. All were treated by an anterior cervical discectomy, fusion and stabilization by plate and screw. All patients were clinically and radiographically evaluated before and after surgery.

**Results:** In the majority (62.5%) patients, the level of involvement was in C5/C6 and 92.8% had a satisfactory outcome. In 4.1% of cases, early complication like superficial wound infection was noted. Late complications were persistence of pain, numbness present in 7.2% cases. The fusion rate was 100% in this series.

**Conclusion:** Anterior cervical decompression and fusion for cervical spondylotic myelopathy is a safe and effective procedure. It is associated with the highest fusion, least complications and relatively lower cost.

**Key-words:** Anterior Cervical Decompression and Fusion, Cervical Spondylotic Myelopathy.

### Introduction

The spinal cord segments in the neck are indicated by C1-C8. At C4-C7 most frequently compression of the spinal cord from cervical spondylotic myelopathy (CSM) occur<sup>1</sup>. The nerves from the spinal cord at this level supply the shoulder, arms and hands<sup>2</sup>. CSM is the most common cause of spinal cord dysfunction in persons more than 55 years of age. With ageing, the degenerative changes in the cervical

spine result in myelopathy. In CSM the onset is insidious and may have various symptoms including sensory and motor disturbances<sup>3</sup>. Treatment of patients with CSM depends on the type and severity of neurologic symptoms, as well as signs and progression of the disease. Patients usually have neck pain and brachialgia but also complain of paraesthesia, numbness, weakness and clumsiness in the arms and legs. Gait might also be affected with a broad-based unstable pattern, decreased velocity, decreased step and stride length, increased double support time, decreased plantar flexion at push-off and increased dorsiflexion of the ankle joint at swing phase, along with the onset of postural stability abnormalities. Hand clumsiness is one of the most common complaints in the setting of compressive cervical myelopathy<sup>4</sup>.

Most patients can be treated conservatively with analgesics, a collar, isometric exercises and gait training but the unpredictably progressive nature of cervical myelopathy, the indications for non-operative management seem limited. Patients with progressive myelopathy should be considered for surgery, as it usually prevents further deterioration and improves neurological outcomes and quality of life. The aim of surgical treatment is to decompress the spinal cord before permanent damage occurs. Surgical decompression of the cervical spinal cord can be performed by either an anterior or a posterior approach. The anterior surgical options can be used for both single-level and multilevel disease. The anterior approach is generally favoured with soft disc herniations, concomitant severe axial neck pain, kyphosis, and with 1-2 levels of involvement<sup>5</sup>. Anterior cervical decompression and fusion (ACDF) utilizes a Smith-Robinson approach to access the anterior surface of the cervical spine. After incision of the platysma, this approach involves little muscle disruption but the opening of the pre-tracheal and prevertebral fascial planes to mobilize the midline structures of the neck. The decompression involves a thorough discectomy with the removal of cartilaginous endplates and posterior osteophytes<sup>6</sup>.

Advantages of ACDF include the ability to directly decompress offending structures, decompress the anterior spinal artery, restore cervical lordosis, and address axial neck pain. Anterior decompression and fusion have been widely adopted and accepted as an effective and safe procedure with satisfactory results for multilevel cervical spondylotic myelopathy<sup>7</sup>. Discectomy and corpectomy are the main procedures to

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anterior decompression of the cervical spine, including removal of disc material and posterior osteophytes impinging on the spinal cord at or immediately adjacent to the level of the disc space<sup>6</sup>. The ventrolateral approach for decompression of the cervical spine and nerve roots has become a well-practiced technique among spinal surgeons. It was first described by Cloward and Smith and Robinson over forty years ago and has evolved to one of the most popular spinal surgery operations. The approach allows for safe and direct decompression of the spinal cord at the site of compression<sup>8</sup>. Anterior approach with the autogenous bone graft will be considered as the gold standard.

## Materials and Methods

A prospective interventional study was done from January 2015 to May 2017 in the Department of Orthopaedic Surgery, Combined Military Hospital (CMH), Dhaka. The patients with cervical spondylotic myelopathy were diagnosed on the basis of presenting complaints, clinical examination and investigations from the spine unit, Department of orthopaedic surgery, CMH, Dhaka. Within this period, a total of 24 cervical spondylotic myelopathies were enrolled as a study sample. All were treated by an anterior cervical discectomy, fusion and stabilization by plate and screw. All patients were clinically and radiographically evaluated before and after surgery. The aims, objectives, procedures, risks and benefits of the study were explained to the selected patients and were encouraged for voluntary participation. Written informed consent was taken from each patient. In this study Nurick grading and Modified Japanese Orthopaedic Association (MJOA) grading for cervical spondylotic myelopathy was used for evaluation of the result and outcome was re-grouped as (a) Excellent (b) Good (c) Fair (d) Poor (Table-I). All the patients undergoing the study were followed up for one year postoperatively. The patients were contacted through telephone or personally. All patients on follow-up were evaluated by detailed clinical examination and radiologically. Functional outcome was assessed by analyzing the differences in pre and postoperative symptoms and signs of cervical spondylotic myelopathy and the Nurick grade and MJOA grading.

**Table-I:** Patients recovery outcome

Outcome	Nurick Grading	MJOA Grading
Excellent	0-1	16-18
Good	2-3	11-15
Fair	4	6-10
Poor	5+	0-5

## Results

Among the 24 patients, 19 (79.1%) were male and 5 (20.8%) were female and age ranged from 30 to 55 years. Level of involvement was maximum at C5/C6 level and it was 64% (Table-II). The second most common level of involvement was C6/C7 and it was 25%. Regarding outcome, 92.8% of cases have satisfactory improvement within 1 year follow up whereas

7.2% of cases have previous symptoms without any significant improvement (Table-III). Regarding complications, 4.1% had superficial wound infection and persistent symptoms in 7.2% cases (Table-IV). All cases attended in scheduled follow up in one year.

**Table-II:** Distribution of patients by level of involvement (n=24)

Level of involvement	Frequency	Percentage
C5/C6	15	62.5
C6/C7	6	25
C4/C5	3	12.5

**Table-III:** Distribution of patients by level of outcome (n=24)

Outcome	Frequency	Percentage
Excellent	22	92.8
Poor	2	7.2

**Table-IV:** Distribution of patients by complications (n=24)

Complication	Frequency	Percentage
Superficial Wound infection	1	4.1
Persistent symptoms	2	7.2

## Discussion

In this study, 92.8% of cases have an excellent outcome within one year follow up whereas 7.2% of cases have a poor outcome (previous symptoms without any significant improvement). Epstein, et al. found that 55% of their patients with cervical spondylotic myelopathy over age 65 had such symptoms. No specific spinal level accounts for this hand involvement, although it is believed to be associated with dysfunction above the C6-C7 level<sup>9</sup>. This study reveals 64% of cases in C5/C6 level and 24% cases in C6/C7 level. A total of 89 patients treated with laminoforaminotomy were reviewed by Kumar et al. who had cervical spondylotic radiculopathy caused by osteophytes<sup>10</sup>. Exclusion criteria were patients with disc herniation. Good or excellent results were obtained in 95.5% of patients, a mean follow-up of 8.6 months using Odom's criteria Davis reviewed 170 patients who underwent laminoforaminotomy for cervical radiculopathy. Basing on Prolo score, follow up at an average of 15 years, showed good or excellent outcomes in 86% of patients. The recurrence rate of 6% with most occurring within the first 3 years of the index surgery<sup>5</sup> was noted.

A comparison of lamino foraminotomy with ACDF in 33 patients for the treatment of cervical herniated discs causing radiculopathy was performed by Herkowitz et al. At a mean follow up of 4.2 years, Good and excellent results were reported in 94% of the ACDF group and 75% of the laminoforaminotomy group. However, the difference was not statistically significant<sup>11</sup>. Peolsson et al. reviewed 34 patients who underwent anterior decompression for cervical radiculopathy with 3-year follow up. There was an improvement in all patients in the Visual Analogue Scale, Neck Disability Index scores, and sensory deficit<sup>12</sup>. Total 292 patients were reviewed with cervical soft

disc disease causing radiculopathy at a single level by Korinath et al. Anterior cervical discectomy using a polymethylacrylate spacer was compared with posterior laminoforaminotomy. At a mean follow up of 6.1 years<sup>13</sup>, good and excellent results were found to be statistically different between the anterior (93.6%) and posterior (85.1%) groups using Odom's criteria. The anterior approach was shown to be of a better outcome.

Suri et al<sup>14</sup> noted in a prospective study with patients of cervical spondylotic myelopathy that patients with less than one-year duration of symptoms showed significantly better motor recovery following an operation than those with a longer duration of symptoms. Many other studies also support this. Regarding complications, 4.1% had superficial wound infection and persistent symptoms in 8.2% cases. Xie Ning and Yuan Wen et al in 2008 reported in a retrospective study for evaluation of complications in patients of sub axial cervical disorders. These patients were treated with an anterior cervical locking plate, and recommendations for prevention and treatment were made. The average length of follow-up was 1.3 years. They showed there were 239 cases (10.7%) with some other kinds of complications<sup>15</sup>.

## Conclusion

Anterior cervical decompression and fusion for cervical spondylotic myelopathy is a safe and effective procedure. It is associated with the highest fusion, least complications and relatively lower cost. Prospective randomized-control trials with good design including similar patients with these clinical scenarios can be helpful to evaluate it properly.

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