

Results of Anterior Cervical Discectomy and Fusion for the Treatment of Single Level Cervical Spondylotic Myelopathy

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ABSTRACT

INTRODUCTION: Cervical spondylotic myelopathy (CSM) is a common spinal cord disorder that develops in elderly people. Anterior cervical discectomy and fusion is an effective and reliable procedure for the treatment of CSM.

METHOD: This Retrospective study was conducted in the department of Orthopedics, Bangubandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from March 2015 to August 2017. Forty patients with CSM diagnosed on the basis of presenting complains, clinical examination and investigations were enrolled in this study. History of the patients was collected, clinical examination was done and relevant investigation was done for each patients. In this study Nurick grading score was used for evaluation of the result.

RESULT: Male were predominant in this study. Mean age of the patients was 45.9±9.1 years. Both sides were affected in 14 (35.0%) cases, only right side was affected in 15 (37.5%) cases and only left side was affected in 11 (27.5%) cases. Involved disc spaces were C3/4 (10.0%), C4/5 (22.5%), C5/6 (42.5%) and C6/7 (25.0%). Transient dysphagia was observed in 2 (5.0%) cases, transient paraparesis in 1 (2.5%) case, wound infection in 1 (2.5%) case and damage to durra in 1 (2.5%) case. Sign of fusion was observed in 10 (25.0%) cases after 3 months, in 30 (75.0%) cases after 6 months and in all patients after 12 months. Result was found excellent in 35 (87.5%) and good in 5 (12.5%) cases.

CONCLUSION: Anterior cervical discectomy and fusion is an effective procedure for the management of cervical spondylotic myelopathy.

KEY WORDS: Anterior Cervical Discectomy and Fusion, Cervical Spondylotic Myelopathy, Nurick's score.

INTRODUCTION

Cervical spondylosis is responsible for spinal cord compression and thus myelopathy.¹ Cervical myelopathy predominantly occurs early in men than in women. Thirteen percent of male suffer from this in 3rd decade of life and almost all after 7th decade. It is

found in 5% of women in the 4th decade, going up to 96% over age of 70.²

Cervical spondylotic myelopathy (CSM) is dependent on many factors.³ Spondylosis means the degenerative changes that occur in the spine, including degeneration of the joints, intervertebral discs, ligaments and connective tissue of the cervical vertebrae. Important pathophysiologic factors in the development of CSM are static-mechanical, dynamic-mechanical and spinal cord ischemia.⁴ The reduction of spinal canal diameter and spinal cord compression is static-mechanical. The intervertebral discs dries out resulting in loss of disc height due to aging.⁵ Dynamic stressors indicate the abnormal motion of the cervical spine during flexion

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or extension, which may cause spinal cord injury synergistically with static mechanical factors.⁶ Spinal cord ischemia occurs when degenerative elements compress blood vessels that supply the cervical spinal cord and proximal nerve roots.⁷

Neck stiffness, unilateral or bilateral deep, aching neck, arm and shoulder pain and possibly stiffness or clumsiness while walking are the signs and symptoms of CSM. Complaints of neck stiffness are common in the early stages of CSM. Weakness or stiffness in the legs is the hallmark symptom of CSM.⁸

Anterior cervical discectomy and fusion (ACDF) procedures are the surgical management of CSM.^{9,10} This procedure allows direct decompression of the spinal canal, enlargement of stenotic neural foramen along with restoration of intervertebral disk height. Various inter-body implanting devices are used for reconstructing the stability of the segment involved after anterior discectomy.^{11,12}

Because of high fusion rate, autogenous tri-cortical iliac crest bone graft is considered as the gold standard of anterior reconstruction.^{13,14} But it causes around 25% of donor site morbidity including hematoma, persistent donor site pain and infection.^{15,16} Bagby designed the first hollow cylindrical cage device (Bagby Bone Basket) made of stainless steel which allowed bone in growth to prevent these complications superscript.¹⁷ Later on the stainless steel cages were replaced by titanium mesh cage (TMC) and became the most widely used device in anterior fusion due to its excellent mechanical behavior and preferable clinical outcome.^{18,19} In this study, cage with bone graft was used.

METHOD

This retrospective study was conducted at the Department of Orthopedics, Bangubandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from March 2015 to August 2017. Forty patients with single level CSM were included in the study on the basis of presenting complaints, clinical examination and investigations. Patients with cervical spine injury (fracture or dislocation), nerve injury, cervical tumors, inflammatory and autoimmune disorder were excluded from this study.

All pre-operative, post-operative x rays and follow

up data were taken then the data were entered into computer and statistical analysis of the results were obtained by using windows based computer software Statistical Packages for Social Sciences (SPSS-22) (SPSS Inc, Chicago, IL, USA). The results were presented in tables and figures. Statistical significance was set at $p < 0.05$ and confidence interval set at 95% level. Continuous variables were expressed as mean with standard deviation and categorical variables as frequency with percentage. Categorical data were assessed by Chi-square test and numerical data were assessed by paired t test.

RESULT

Table 1: Age and gender distribution (N=40)

	Frequency (N)	Percentage (%)
Age (years)		
≤40	9	22.5
41 – 50	20	50.0
51 – 60	8	20.0
>60	3	7.5
Mean ±SD (min-max)	45.9 ± 9.1 (30 – 65)	
Gender		
Male	29	72.5
Female	11	27.5

Table 1 shows distribution of patients according to age and gender. Mean age was 45.9 ± 9.1 years within the range of 30-65 years with male predominance.

Table 2: Side of pain and disc space involvement distribution (N=40)

Affected side	Frequency (N)	Percentage (%)
Right	15	37.5
Left	11	27.5
Both	14	35.0
Disc space involvement		
C _{3/4}	4	10.0
C _{4/5}	9	22.5
C _{5/6}	17	42.5
C _{6/7}	10	25.0

Both sides were affected in 14 (35.0%) cases, only right side was affected in 15 (37.5%) cases and only left side was affected in 11 (27.5%) cases. Involved disc spaces were C_{3/4} (10.0%), C_{4/5} (22.5%), C_{5/6} (42.5%) and C_{6/7} (25.0%).

Table 3: Perioperative complication distribution (N=40)

Peri operative complications	Frequency (N)	Percentage (%)
Damage to the dura	1	2.5
Wound infection	1	2.5
Transient dysphagia	2	5
Transient paraparesis	1	2.5

Table 3 shows perioperative complications. Transient dysphagia was seen in 2 (5.0%) patients which were recovered within very short period. Transient paraparesis, wound infection and damage to the dura were observed in 1 each patients.

Table 4: Outcome distribution at follow up (N=40)

Clinical and radiological findings	Pre operative	Post operative			
		1 month	3 month	6 month	12 month
Pain	40 (100.0)	10 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)
Gait disturbance	40 (100.0)	2 (5.0)	0 (0.0)	0 (0.0)	0 (0.0)
Neck stiffness	40 (100.0)	4 (10.0)	1 (2.5)	0 (0.0)	0 (0.0)
Transient paraparesis	0 (0.0)	1 (2.5)	0 (0.0)	0 (0.0)	0 (0.0)
Weakness of both lower limb	40 (100.0)	4 (10.0)	1 (2.5)	0 (0.0)	0 (0.0)
Sign of fusion		0 (0.0)	10 (25.0)	30 (75.0)	40 (100.0)

Table 4 shows that after 1 month, 10 (25.0%) patients had pain. Neck stiffness was observed in 4 (10.0%) patients and gait disturbance was observed in 2 (5.0%) patients. After 3 months, neck stiffness was observed in 1 (2.5%) patient. After 6 months, no complication was observed. All patients had weakness of both lower limbs before operation. After operation, it was present in 4 (10.0%), 1 (2.5%) and 0 (0.0%) patients after 1 month, 3 months and 6 months respectively. Sign of fusion was observed in 10 (25.0%) patients after 3 months, in 30 (75%) patients after 6 months and in 40 (100%) patients after 12 months.

Table 5: Functional outcome of the patients according to Nurick grading (N=40)

Result	Frequency (N)	Percentage (%)
Excellent	35	87.5
Good	5	12.5
Fair	0	0.0
Poor	0	0.0



Figure 1: Preoperative X-ray

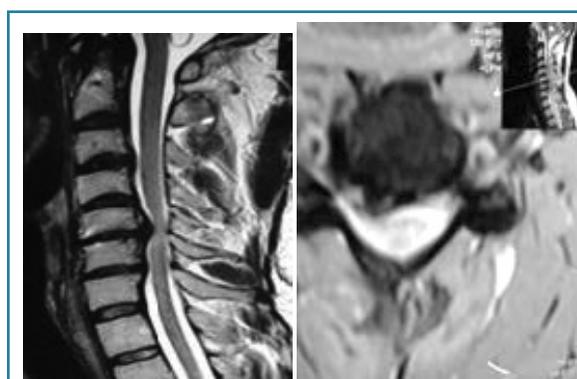


Figure 2: Preoperative MRI of cervical spine sagittal and axial view

Table 5 shows functional outcome of the patients. After treatment, all patients were followed up at 1, 6 and 12 months. Outcome was assessed using Nurick grading. Result was found to be excellent in 35 (87.5%) and good in 5 (12.5%) cases.

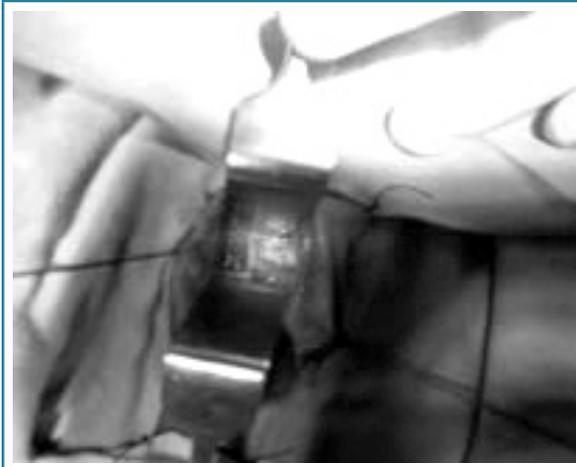


Figure 3: Per-operative picture

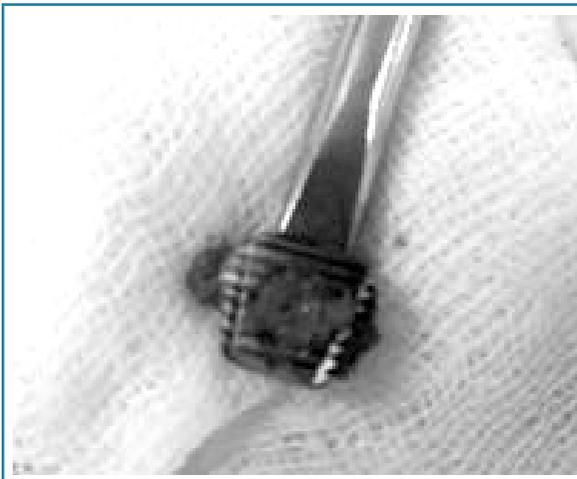


Figure 4: Cage with bone graft



Figure 5: Per-operative C-arm picture



Figure 6: Post operative X-ray

DISCUSSION

Most of the patients were in age group 41-50 years. Mean age of the patients (45.9 ± 9.1 years) was less compared to other studies.^{20,21} Male predominance in this study was consistent with above studies.

Both sides were affected in 14 (35.0%) cases, only right side was affected in 15 (37.5%) cases and only left side was affected in 11 (27.5%) cases. Most commonly involved interspace was C5/6 (42.5%), mobile area of cervical spine, which was similar to the findings from the literature.^{10,22}

Transient dysphagia was seen in 2 (5.0%) patients. It was less (2.8%) in the study of Yu.²¹

ACDF of 1 to 3 levels has been reported to be effective and safe in decompressing ventral pathology. The rate of fusion in single-level ACDF ranges from 80% to 95% in the literature.^{23,24} Sign of fusion was observed in all patients after 12 months in our study.

Nurick grading outcome has varied in different studies. Smith found excellent, good, fair and poor results in 64.2%, 14.2%, 14.2% and 7.1% patients respectively.¹⁰ Rosenorn showed 41.3% excellent, 27.5% good, 6.2% fair and 24.1% poor result.²⁵ in the study by Islam, outcome was excellent in 50%, good in 37.5% and fair in 12.5%.²⁶ Our result was excellent in 35 (87.5%) and good in 5 (12.5%) cases.

CONCLUSION

Anterior cervical discectomy and fusion is an effective procedure for the management of cervical spondylotic myelopathy.

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