



## Pre and Postoperative Complication of Anterior Cervical Decompression and Interbody Fusion by Stand Alone Anchored Spacer in Cervical Degenerative Disc Disease

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### Abstract

**Background:** The anterior cervical decompression and fusion (ACDF) surgery was first described by Smith and Robinson and Cloward RB in the 1950s. This procedure has since become the standard for treating degenerative cervical disc disease. **Material & Methods:** This Prospective Quasi-Experimental Study was conducted at the department of National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR) and Dhaka Medical College Hospital, Bangladesh. The study was conducted during the period of 06 May 2019 to 05 May 2020 and 24 Patients were included by non-randomized purposive sampling according to the availability of the patient and strictly considering the inclusion and exclusion criteria. The analysis was done by SPSS 20.0 for windows software. **Results:** The age range of patients was 32 to 68 years, with a mean age of 51.67 ( $\pm 11.15$ ) and male-female ratio was 11:1. Occupation of the subjects demonstrates that service holder comprised the main bulk 8 (33.3%). Other occupants were farmer 6 (25.0%), businessman 4 (16.7%), driver 2 (8.3%), house wife 2 (8.3%) & manual labour 2 (8.3%). 4 (16.7%) patients had per-operative hemorrhage. There were no dural injuries or recurrent laryngeal nerve palsy. It was observed that 4 (16.7%) patients developed dysphagia, 2 (8.3%) patient had infection and 6 (25%) patients had neck pain. There was no temporary hoarseness or respiratory problems. **Conclusion:** The study shows that the anterior cervical decompression and interbody fusion by stand-alone anchored spacer are relatively easy, safe and an effective procedure for patients with cervical degenerative disc disease with good neurological and radiological outcome. It provides immediate stability to the affected area, reduces the risk of graft extrusion, avoids the need for extended post-operative external immobilization, and significantly shortens the rehabilitation period.

**Keywords:-** Decompression, Fusion, Interbody, Cervical, Anchored.

## INTRODUCTION

Cervical degenerative disc disease has a significant impact on human health and quality of life. Surgical treatment should be performed in time when cervical intervertebral disc degeneration or secondary compression of adjacent vertebral artery, nerve root, and spinal cord occur. Currently, anterior cervical decompression and bony fusion which has a certain curative effect, is regarded as a standard surgical procedure for cervical degenerative disc disease. The anterior cervical discectomy and fusion (ACDF) surgery was first described by Smith and Robinson and Cloward RB in the 1950s.<sup>[1,2]</sup> This procedure has since become the standard for treating degenerative cervical disc disease. The usual surgical procedure for treating cervical spondylotic disorders (such as a degenerative cervical illness with myelopathy or radiculopathy) has been anterior cervical discectomy and fusion (ACDF).<sup>[3,4]</sup> The purpose of this procedure is to preserve stabilization of the afflicted section, achieve effective neural (such as spinal cord and nerve root) decompression, and restore cervical spine lordosis.<sup>[5,6]</sup> A typical approach for ACDF is anterior plate construct (APC).<sup>[7]</sup> Anterior cervical plate and cage has often been adopted in anterior cervical spine surgery, but it has several postoperative disadvantages such as dysphagia, postoperative pain and adjacent level degeneration. Therefore, the clinical treatment of cervical degenerative disc disease has been in badly need of a new system, which can not only decrease postoperative complications like dysphagia, but also relief postoperative pain and achieve intervertebral fusion.<sup>[8]</sup> In recent years, with the development of anterior cervical fusion technique, anterior

cervical interbody fusion device has been gradually used in the surgical treatment of cervical degenerative disc disease. After being inserted, standalone cage can calibrate automatically, and its fixed screw is one-step-locking, which is easy to operate.<sup>[8]</sup> In particular, it can increase immediate stability of a treated segment as compared with the stand-alone concept, even in the absence of an implant on the anterior cervical spine as in the case of cervical plating.<sup>[9]</sup> The incidence of dysphagia in patients undergoing anterior cervical fusion using two different profiles of plate and found significantly less dysphagia with the smaller profile.<sup>[10]</sup> Miao et al. also compared the bone fusion rate in standalone cage with standalone anchored spacer; there was no significant difference between the two groups.<sup>[11]</sup>

## Objectives

The objective of the study was to evaluate Pre and postoperative complication of cervical degenerative disc disease treated with anterior cervical decompression and interbody fusion by standalone anchored spacer.

## MATERIAL AND METHODS

This Prospective Quasi-Experimental Study was conducted at the department of National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR) and Dhaka Medical College Hospital, Bangladesh. The study was conducted during the period of 06 May 2019 to 05 May 2020 and 24 Patients were included by non-randomized purposive sampling according to the availability of the patient and strictly considering the inclusion and exclusion criteria.

**Inclusion criteria**

1. Single level cervical degenerative disc disease.
2. Neurological manifestations with patients with radiculopathy, myelopathy and radiculomyelopathy
3. Age range- 20-75 years
4. Both sex

**Exclusion criteria**

1. Patients with infective pathology
2. Patients with metastatic disease
3. Patients with traumatic disc rupture

The data were collected in a prescribed data collection sheet with a pre-tested structured questionnaire containing history, clinical examination, laboratory investigations, pre-operative and per-operative assessment, preoperative findings and postoperative outcomes. The analysis was done by SPSS 20.0 for windows software. The data were tabulated and quantitative parameters such as the age of the patient will be summarized in terms of mean and median. Standard deviation was computed to understand the variation present in the data. Percentage expression for positivity of scoring was estimated along with 95% confidence interval. The significance of the results as determined in a 95.0% confidence interval.

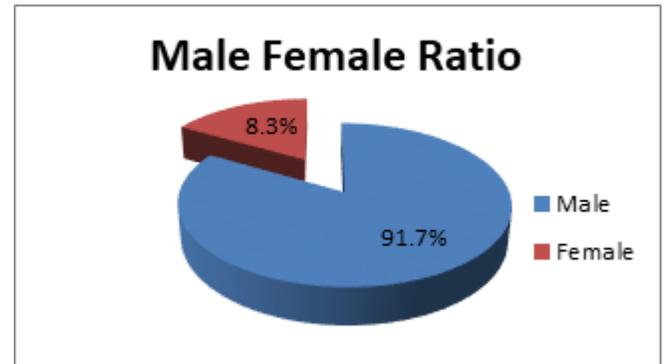
**RESULTS**

[Table 1] showing the age range of patients was 32 to 68 years, with a mean age of 51.67 (±11.15)

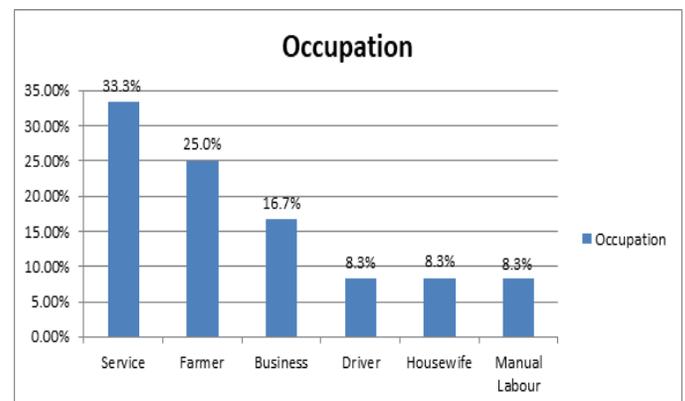
**Table 1:** Age distribution of the study patients (n=24)

Age in years	Number	Percentage
20-34 years	02	8.3
34-49 years	06	25.0
50-64 years	12	50.0

years. The highest number of patients 12 (50.0%) was observed in the 5<sup>th</sup> decade.



**Figure 1:** Gender distribution of the study patients (n=24) showing the male population in the study constituted 22 (91.7%) while the female made up the remaining 02 (8.3%) with a male-female ratio of 11:1.



**Figure 2:** Occupation of the subjects demonstrates that service holder comprised the main bulk 8 (33.3%). Other occupants were farmer 6 (25.0%), businessman 4 (16.7%), driver 2 (8.3%), house wife 2 (8.3%) & manual labour 2 (8.3%).



65-75 years	04	16.7
Total	24	100.0
Mean $\pm$ SD	51.67 ( $\pm$ 11.15)	Range 32-68 years

**Table 2:** Co-morbidity.

Co-morbidity	Number	Percentage
Hypertension	08	36.4
Smoking	06	27.2
Diabetes mellitus	08	36.4
Total	22	100.0

[Table 2] Shows the distribution of patients according to co-morbidity or risk factor. In this study, Diabetes mellitus and Hypertension were the most common associated risk factors for degenerative disc diseases.

**Table 3:** Presentation of patients on admission.

Findings	Number	Percentage
Radiculopathy	10	41.7
Myelopathy	06	25.0
Radiculo-Myelopathy	08	33.3
Total	24	100.0

[Table 3] Shows the distribution of patients according to presentation on admission. Radiculopathy 10 (41.7%) was the most common presentation. Then Radiculo-myelopathy 8 (33.3%) and only Myelopathy was 6 (25%) patients.

**Table 4:** Number of operated level of cervical spine (N = 24)

Cervical segment	Number	Percentage
C3-C4	02	8.3
C4-C5	08	33.3
C5-C6	10	41.7
C6-C7	04	16.7
Total	24	100.0

[Table 4] Shows the distribution of patient's according to cervical segment involved. Among the level involved, highest in C5-C6 10 (41.7%) and rest of the levels were C4-C5 8 (33.3%), C6-C7 4 (16.7%) & C3-C4 2 (8.3%) level.

**Table 5:** Per-Operative complications

Complications	Number	Percentage
Haemorrhage	04	16.7
Dural injury	0	0.0
Recurrent laryngeal nerve palsy	0	0.0

[Table 5] Regarding per-operative complication, 4 (16.7%) patients had per-operative haemorrhage. There were no dural injuries or recurrent laryngeal nerve palsy.

**Table 6:** Post-operative complications

Complications	Number	Percentage
Dysphagia	04	16.7
Temporary hoarseness	0	0.0
Respiratory problem	0	0.0
Neck pain	06	25.0
Infection	02	8.3

[Table 6] Regarding post-operative complication, it was observed that 4 (16.7%) patients developed dysphagia, 2 (8.3%) patient had infection and 6 (25%) patients had neck pain. There was no temporary hoarseness or respiratory problems.

## DISCUSSION

The present study has been undertaken in NITOR from May 2019 to May 2020 to evaluate the outcome of anterior cervical decompression and interbody fusion by standalone anchored spacer with patients have cervical degenerative disc diseases with neurological manifestations. A total 12 patients satisfying the inclusion and exclusion criteria were selected for this study. In this study, the age range of patients was from 20-75 years, with mean age of  $51.67 \pm 11.15$  years. Majority of the patients in this series were in the age group of 50-64 years (50%), while the next common age group was 35-49 years (25.0%). Xiao et al,<sup>[12]</sup> selected mean age  $42.7 \pm 5.3$  years (range 38-61 years). Dawood et al.<sup>[13]</sup> stated mean age  $50.53 \pm 10.57$  years (range 29-68 years). Both the results correlate with the findings of this study. High incidence of patients in 5th decades in the present series is due to working group people. Male population in the study constituted 91.7 % of cases, while the female made up the remaining 8.3%. Park et al,<sup>[14]</sup> observed a male predominance (Male-

69.2 % & Female- 30.8 %). According to the series of Alimi et al,<sup>[15]</sup> male were 53 (51%) and female were 51 (49%). According to the series of Yan et al,<sup>[16]</sup> male were 29 (59.1%) and female were 20 (40.9%). In all the series, male representation is the majority. Male, being the major working force of the society are more consistently exposed to the external environment, which probably accounts for this discrepancy. On the other hand, it may be due to the fact that the female might have been neglected from modern facilities due to socio-cultural economic conditions of the country. In this study, the most involved occupational group was service holders (33.3%) followed by farmer (25.0%), businessman (16.7%), and others (e. g; driver, House wife, manual labour) comprises 8.3 % each. Most of the occurrences were in service holder group as leaning forward position increases stress on cervical spine. In this study, most of the patients (41.7%) presented with radiculopathy alone, rest of them presented with radiculomyelopathy (33.3%) and myelopathy alone (25%)

respectively. According to the series of Dawood et al,<sup>[13]</sup> radiculopathy was 43.33%, radiculomyelopathy 30% and myelopathy alone 26.66% which was almost similar findings of this study. In this study most involved level of spine was C5/C6 (41.7%); Next common involved level was C4-C5 (33.3%). ZHANG et al,<sup>[17]</sup> also showed that most involved level of spine C5-C6 (44.4%) & C4-C5 (33.33%). Lee et al,<sup>[18]</sup> showed most common involved level C5/C6 (65%); next common to it was C4/C5 (18.33%). Among the post-operative complication, neck pain was highest in 6 (25%) patients. Next common complication was dysphagia in 4 (16.7%) patients followed by infection in 2 (8.3%) patient. According to the

series of Wang et al. (2015) there was post-operative dysphagia among 20% patients.

## CONCLUSIONS

The study shows that the anterior cervical decompression and interbody fusion by stand-alone anchored spacer are relatively easy, safe and an effective procedure for patients with cervical degenerative disc disease with good neurological and radiological outcome. It provides immediate stability to the affected area, reduces the risk of graft extrusion, avoids the need for extended post-operative external immobilization, and significantly shortens the rehabilitation period.

## REFERENCES

1. Smith GW, Robinson RA: The treatment of certain cervical spine disorders by anterior removal of the intervertebral disc and interbody fusion. *J Bone Joint Surg Am.* 1958;40:607-24.
2. Cloward RB: The anterior approach for removal of ruptured cervical discs. *J Neurosurg.* 1958;15:602-17.
3. Han SY, Kim HW, Lee CY, Kim HR, Park DH. Stand-alone cages for anterior cervical fusion: are there no problems? *Korean J Spine.* 2016;13(1):13-9. doi: 10.14245/kjs.2016.13.1.13
4. Mummaneni PV, Kaiser MG, Matz PG, Anderson PA, Groff MW, Heary RF, et al. Cervical surgical techniques for the treatment of cervical spondylotic myelopathy. *J Neurosurg Spine.* 2009;11(2):130-41. doi: 10.3171/2009.3.SPINE08728
5. Klineberg E. Cervical spondylotic myelopathy: a review of the evidence. *Orthop Clin North Am.* 2010;41(2):193-202. doi: 10.1016/j.ocl.2009.12.010
6. Song KJ, Taghavi CE, Lee KB, Song JH, Eun JP. The efficacy of plate construct augmentation versus cage alone in anterior cervical fusion. *Spine.* 2009;34(26):2886-92. doi: 10.1097/BRS.0b013e3181b64f2c
7. Smith GW, Robinson RA. The treatment of certain cervical-spine disorders by anterior removal of the intervertebral disc and interbody fusion. *J Bone Joint Surg Am.* 1958;40-A(3):607-24.
8. Xiao Y, Shi Y, Li H, Xu K. Application of Zero-P on anterior cervical decompression and bone fusion. *Int J ClinExp Med.* 2017;10(4):7077-7083.
9. Vanek P, Bradac O, DeLacy P, Lacman J, Benes V. Anterior interbody fusion of the cervical spine with Zero-P spacer: prospective comparative study – clinical and radiological results at a minimum 2 years after surgery. *Spine.* 2013;38(13):E792-E797.
10. Wang Z, Jiang W, Li X, Wang H, Shi J, Chen J, et al. The application of zero-profile anchored spacer in anterior cervical discectomy and fusion. *Eur Spine J.* 2015;24(1):148-54. doi: 10.1007/s00586-014-3628-9.
11. Miao J, Shen Y, Kuang Y, Yang L, Wang X, Chen Y, et al. Early follow-up outcomes of a new zero-profile implant used in anterior cervical discectomy and fusion. *J Spinal Disord Tech.* 2013;26(5):E193-7. doi: 10.1097/BSD.0b013e31827a2812.
12. Xiao S, Liang Z, Wei W, Ning J. Zero-profile anchored cage reduces risk of postoperative dysphagia compared with cage with plate fixation after anterior cervical discectomy and fusion. *Eur Spine J.* 2017;26(4):975-984. doi: 10.1007/s00586-016-4914-5.
13. Dawood OM, AbdelGhany WA, Desoky AE, Sabry H. Clinical Outcome Results of Stand Alone Anchored Spacer for Anterior Cervical Discectomy and Fusion. *Egy Spine J.* 2018;26:6-14.



14. Lu Y, Fang Y, Shen X, Lu D, Zhou L, Gan M, et al. Does zero-profile anchored cage accompanied by a higher postoperative subsidence compared with cage-plate construct? A meta-analysis. *J Orthop Surg Res.* 2020;15(1):189. doi: 10.1186/s13018-020-01711-9.
  15. Alimi M, Njoku I, Hofstetter CP, Tsiouris AJ, Kesavabhotla K, Boockvar J, et al. Anterior Cervical Discectomy and Fusion (ACDF): Comparison Between Zero Profile Implants and Anterior Cervical Plate and Spacer. *Cureus.* 2016;8(4):e573. doi: 10.7759/cureus.573.
  16. Yan B, Nie L. Clinical comparison of Zero-profile interbody fusion device and anterior cervical plate interbody fusion in treating cervical spondylosis. *Int J Clin Exp Med.* 2015;8(8):13854-8.
  17. Zhang L, Wang J, Tao Y, Feng X, Yang J, Zhang S. Outcome Evaluation of Zero-Profile Implant Compared with an Anterior Plate and Cage Used in Anterior Cervical Discectomy and Fusion: A Two-Year Follow-Up Study. *Turk Neurosurg.* 2016;26(3):416-22. doi: 10.5137/1019-5149.JTN.12017-14.1.
  18. Lee YS, Kim YB, Park SW. Does a zero-profile anchored cage offer additional stabilization as anterior cervical plate? *Spine (Phila Pa 1976).* 2015;40(10):E563-70. doi: 10.1097/BRS.0000000000000864.
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