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Original Article

Multilevel anterior cervical fusion with standalone cage or cage-and-plate after cervical discectomy: Benefits and drawbacks

Keyvan Eghbal [a], Iman Ahrari [a, *], Fazlollah Kamrani [a], Somayeh Mohamamdi [b], Arash Saffarian [a], Mohamad Jamali [a], Abbas Rakhsha [a], Reza Taheri [a], Abdolkarim Rahmanian [a], Meisam Eqbal [c]

[a] Department of Neurosurgery, Shiraz University of Medical Sciences, Shiraz, Iran
[b] Department of Anesthesiology, Preoperative and Pain Medicine, Brigham and Woman's Hospital, Harvard Medical School, Boston, MA, USA
[c] Sinopec Medical Center, Department of QHSE, Sinopec International Petroleum E&P Corporation, Yadavaran Oil Field, Ahwaz, Iran

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ABSTRACT

Purpose: Multilevel anterior cervical discectomy and fusion (ACDF), especially two-level ACDF, has been usually performed in the cervical degenerative disease, and the incidence rate of complications is controversial. This study aimed to compare the outcomes of ACDF approach with cage alone and with plate fixation in multilevel discectomy.

Methods: Patients who had undergone multilevel ACDF by the Smith-Robinson methods were included from 2018 to 2020. Data were collected using a questionnaire containing demographic characteristics, surgical complications, and outcome. All the patients were followed for 18 months post-surgery. Visual Analogue Scale (VAS), Neck Disability Index (NDI) and Nurick Grading scale were used to measure the pain degree, neck pain effect, and myelopathy grade, respectively. Bone fusion rate, subsidence and instrument failure were checked through radiography. Data were analyzed using SPSS, and the significant level was considered 0.05.

Results: 24 patients were included. There was no significant difference between the mean blood losses in the two groups. The rate of subsidence was much higher in group B after 18 months (60% vs 14.3%). As to the VAS score, NDI, and Nurick scale, trend change overtime was significantly improved in each group, but there was no significant difference between the groups. There was no significant difference between the two groups regarding bony fusion rate.

Discussion: ACDF with plate leads to a more prolonged surgery with no significant benefits. Stand-alone cage approach could be suggested as the gold standard for anterior cervical discectomy.

1. Introduction

Cervical spondylosis is a degenerative disease of the cervical spine which usually presents with radiculopathy and myelopathy. Anterior cervical discectomy has become the gold standard treatment for cervical disc herniation and provides immediate foraminal decompression, load bearing support to the anterior column and restoration of the disc height, and facilitates inter-body fusion through inter-body cage replacement.[1] ACDF has been introduced as the main approach for cervical disc herniation. However, some drawbacks such as the fusion rate, subsidence, and pseudo-arthrosis have been reported regarding the use of this method.[2]

Development of a technique in anterior cervical fixation led to the introduction and routine application of anterior plate fixation in order to provide additional stability.[3] The addition of plate fixation showed an increase in the rate of stability and lordosis and a decrease in the incidence of cage subsidence. Although ACDF is less invasive compared to ACDF-P, the rate of subsidence and pseudoarthrosis is higher.[3,4] The results of a meta-analysis by Tseng showed a better long-term VAS-arm pain score in patients who had

Abbreviations: ACDF, Anterior cervical discectomy and fusion; VAS, Visual Analogue Scale; NDI, Neck Disability Index.

* Corresponding author. Department of Neurosurgery, Shiraz University of Medical Sciences, Shiraz, Iran.
E-mail address: aharaia@sums.ac.ir (I. Ahrari).

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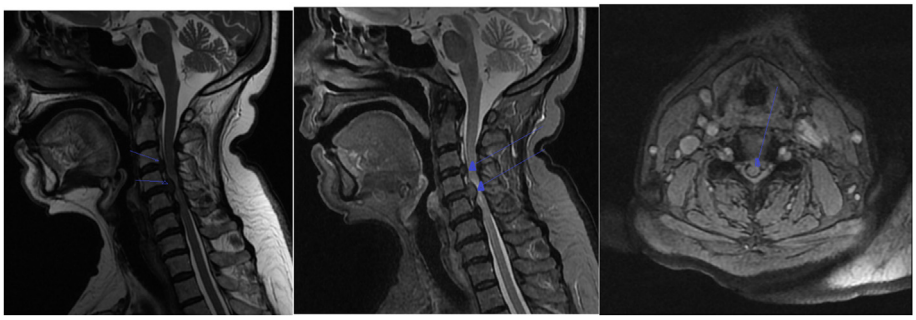

Fig. 6. sagittal (STIR and T2) and axial MRI imaging shows degenerative disk herniation in C3/4/5/6 levels.

necessary to avoid this problem. Their results confirmed this issue that the incidence rate of subsidence is lower in cage and plate fixation approach.[12,13] Aggressive removal of the endplates, larger height of the cage, and over-distraction and forceful implantation of the cage increased the risk of subsidence, which should be avoided. The best approach is to remove the parts of the end plate to promote the fusion and leave the other parts intact to minimize subsidence [23,3].

In the 18-month follow up in our study, the total fusion rate in all operated spine levels was 75.9%. With increase in the number of the spinal segments involved, the fusion success rate was decreased. In 8.3% of the patients with 3 segment involvement and 16.7% of 2 segment involvement, fusion was formed in only one level. In Elsayed's series, the fusion rate was 78.9% in group A and 85.7% in group B; also, in Hwang'study, the rate of fusion at 1-year follow-up was 90.6% and 91.6% in the two groups.[13,17]

Fusion formation seems to have a correlation with better fixation. Presence of micro-motions inhibits the formation of bone and increases the risk of psudoarthrosis, so cage and plate fixation should prepare a better fusion.[24,25] The results of our study did not support this idea and showed that there was no correlation between the fusion rate and plate fixation. The findings of Elsayed and Hwang's study support our data.[13,17] In our study, increased number of the operated segments was correlated with lesser fusion rate. In fact, based on our findings, the factor which defines subsidence and mal-union is the number of involved segments rather than the presence or absence of the plate.

Dysphagia and transient hoarseness were the common complications of our patients. 20.8% of the patients had dysphagia, and 16.7% had hoarseness. The incidence of hoarseness in the plate fixation group was more (20% in group B in comparison to 14% in the cage group), while the incidence of dysphagia was almost similar in both of them (21.4% in group A compared to 20% in group B). In previous studies, the frequency of dysphagia was more in the plate fixation group such as Elsyad's study. It occurred in 10 patients (52.6%) in group A and 12 (85.7%) patients in group B.[13] Also, in a meta-analysis by Cheung, dysphagia was significantly more frequent in the plate fixation group.[12] The possible causes of dysphagia are multi-level surgery (long term operation), recurrent surgery, older patients, and female sex. Dysphagia was more prevalent in C3–C4 and C5–C6 levels. Soft tissue swelling due to retraction and trauma to the superior laryngeal nerve is also suggested to account for this.[26] Both these complications were transient in our patients, and no further intervention was needed. The short-term follow-up and small sample size are the limitations of our study which was due to COVID pandemic. We suggest further studies with larger sample size to allow a definite conclusion.

5. Conclusion

Based on our results, there was no significant difference in terms of complications and fusion rate between the two groups. Otherwise, the incidence of subsidence and amount of bleeding were observed more in the plate fixation group. Given the morbidities that might occur due to a more prolonged surgery with no additional benefit, we suggest the stand-alone cage approach as the gold standard for anterior cervical discectomy. It should be noted that the more the spinal segments operated, the more subsidence and less fusion rate irrelevant to surgical approach. We should declare that number of participated patients was one of limitations of our study which was due to COVID pandemic and we suggest that this surgery approach be studied in greater groups.

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