

Anterior Cervical Decompression And Fusion: Does The Addition Of A Plate Reduce Axial Neck Pain In The Short Term?

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Citation

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Abstract

Objectives: The aim of the current study is to examine the hypothesis that the inclusion of a plate when performing anterior cervical discectomy and fusion (ACDF) results in a more initial stable motion segment in the early postoperative period and therefore a reduction in axial neck pain.

Summary of Background Data: ACDF is a commonly performed procedure with much controversy surrounding the role of anterior cervical locking plates. There is anecdotal evidence that the use of a locking plate reduces axial neck pain in the short-term postoperative period, however this question has not been examined in the literature.

Methods: Over a 42-month period, 54 patients were entered into a prospective study to examine postoperative axial neck pain scores following ACDF, with and without a plate.

Results: There is a minor benefit awarded to those patients who have received a plate in terms of reduced postoperative axial neck pain on the day 7, 1 month and 3 month time periods. However there is a statistical difference only at the day 7 mark ($p=0.029$).

Conclusions: The data does not provide strong evidence that the addition of an anterior locking plate reduces significant axial neck pain in the short-term postoperative period.

KEY POINTS

- There is anecdotal evidence that the use of a locking plate with ACDF reduces axial neck pain in the short-term.
- 54 patients were studied to examine postoperative axial neck pain scores following ACDF, with and without a plate.
- There is a minimal benefit awarded to those patients who have received a plate in terms of reduced postoperative axial neck pain with a statistical difference at the day 7 mark only.
- This study does not support the use of a locking plate for reducing axial neck pain scores in the postoperative period.

INTRODUCTION

Anterior cervical discectomy and fusion (ACDF) is a commonly performed procedure. There is much controversy surrounding the role of anterior cervical locking plates for patients undergoing ACDF for degenerative cervical disc disease ¹. Further more, although clinical outcomes remain good for ACDF, there does not appear to be any strong correlation with radiographic results. ² There is some anecdotal evidence that the use of a locking plate reduces axial neck pain in the short-term postoperative period ³, however this question has not been examined in detailed with a retrospective or prospective study. A number of authors use a locking plate as part of the ACDF procedure for various reasons such as; potential increased fusion, reduced need for a cervical orthosis and perceived rapid return to work. Initial postoperative stability during the fusion process has been stated to reduce neck pain ⁴. The

aim of the current study is to examine the hypothesis that the inclusion of a plate with the ACDF procedure results in a more stable motion segment in the early postoperative period and therefore a reduction in axial neck pain.

MATERIALS AND METHODS

Over a 42-month period, 53 patients were entered into a study to examine postoperative axial neck pain scores following anterior cervical decompression and fusion, with (ACDFP) and without (ACDF) a plate. The inclusion criteria for the study were single level fusion only, 1st time cervical surgery, cervical levels C5/6 and 6/7 only (considered for relative ease of access) and no other “distracting” pathologies such as low back or head ache. The higher cervical levels (C2/3, C3/4 and C4/5) were not included as a persistent radiculopathy in the postoperative period from these levels could be more easily mistaken by the patient as diffuse neck pain.

Nine surgeons from three hospitals were involved in the study with a similar fusion technique. The surgical incision was linear in fashion and exposure of the anterior aspect of the vertebral column was performed with a variety of retractor systems. Following the discectomy and decompression, all patients had the application of an autologous iliac crest interposition graft into the discectomy site. Three types of anterior cervical plates were used during the study period; Orion, Atlantis and Zephir plates (Medtronic, Memphis TN, USA). A cervical orthosis was used in the non-instrumented cohort only.

After surgery, patients were followed prospectively for a 3-month period by the author and contacted in the postoperative period at 24 hours, 7 days, 1-month and the 3-month mark. The patient was asked specifically to score medication free neck pain only for the questionnaire. Residual radicular arm pain and graft site pain were requested to be treated as a separate entity so that neck pain only was accurately scored. The Visual Analogue Scale (VAS) score is ranked from 0 (no pain) to 10 (worst imaginable pain) and is a reliable method to assess pain in the clinical setting⁵. Data was collected and stored in Microsoft Excel format and statistics calculated using the 2 sample T-test⁶.

RESULTS

Ninety-four patients underwent ACDF with or without plate fixation during the 42-month study period. Of these, 56% (n=54) of patients were entered as they fulfilled the inclusion

criteria. 31 (58%) patients did not receive a plate (ACDF or “non-plated”) and 23 patients (42%) received a plate (ACDFP or “plated”). 64% of patients were male (n=35) and 36% female (n=19). The mean age of the patients in the non-plated group was 44 (sd=11) and 46 (sd=13) in the plated group.

Table 1 summarizes the mean VAS score results of the plated vs. non-plated groups. There is no statistical difference in preoperative raw data scores between male and female or plated vs. non-plated at the 5% level of significance (2-tail t-test assuming equal variances). In addition there was no difference between male and female, plated vs. non-plated in pain reduction at 3 months postoperatively. Preoperatively, the VAS scores were similar (Graph 1) between both plated and non-plated groups (3.6 and 3.7 respectively). At day 1 post operation, the plated group had a higher mean VAS score of 4.8 compared with 4.4 in the non-plated group. The largest difference between the two groups in VAS scores was at the day 7 mark. The plated group had a statistically significant lower VAS score of 2.9 compared with 3.7 in the non-plated group (p=0.029; 2 sample T-test assuming equal variance). At the 1-month mark, this trend continued with the plated group having a VAS score of 2.4 compared with 2.8, however this difference was not significant. At the 3-month mark, the VAS scores were similar with the plated group being slightly lower. In addition, the analysis of VAS mean score of postoperative pain reduction (Graph 2) demonstrates that at the day 7 mark, the plated group had an overall decrease in pain as compared to the non-plated group which still had a higher VAS than preoperatively (p=0.01).

Figure 1

Table 1: Mean VAS scores of plated vs. non-plated with statistical significance (2 sample T-test).

Time	ACDFP-plated group (SD)	ACDF-non plated (SD)	Statistical significance
Preop	3.6 (1.7)	3.7 (1.6)	No
Day 1	4.8 (1.6)	4.4 (1.3)	No
Day 7	2.9 (1.0)	3.7 (1.6)	Yes (P=0.029)
1 Month	2.4 (1.0)	2.8 (1.4)	No
3 Month	1.3 (0.9)	1.5 (1.0)	No

Figure 2

Graph 1: Axial neck pain comparison of plated vs. non-plated.

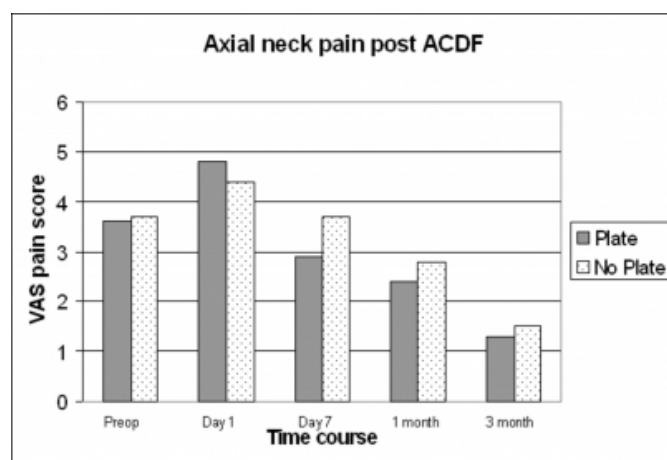
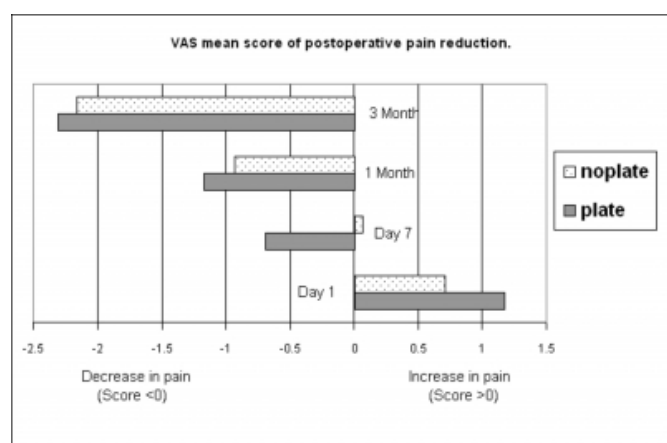


Figure 3

Graph 2: Analyses of group mean differences. At the day 7 mark, decrease in pain is significant ($p=0.01$). There is no significance at 1 month ($p=0.2$) and 3 month ($p=0.4$).



DISCUSSION

Plating of the cervical spine has its origins in the early 1980's for the treatment of cervical spine trauma ⁷. Since this time, numerous papers have discussed the role of plating for ACDF in the patient with degenerative disc disease. A recent large study provides further evidence of the superior radiological fusion rates experienced in the plated cohort of patients ⁸. Although there is anecdotal evidence that fixation with plates reduces short-term axial neck pain experienced by these patients, to date there has been no prospective or retrospective study to examine this issue.

On initial review of the VAS scores (see Graph 1), there appears to be a minor benefit awarded to those patients who have received a plate in terms of postoperative axial neck

pain at the day 7, 1 month and 3 month mark. A closer examination of the data reveals that the only time period where there is a statistical difference between the two groups is at the 1 week postoperative mark, with the plated group having lower neck pain scores ($p=0.029$). Although this trend is continued to the 1-month and 3 month mark, the results are without statistical significance.

The author accepts the several draw backs of this study. Firstly the investigation is a prospective, non-randomized study. Secondly, intravenous and per oral pain medication was not documented at each time period recorded. Although this was considered at a later stage, the study would have effectively become a retrospective type data analysis rather than prospective, and was therefore excluded. Despite the drawbacks, this study is the first attempt in the literature to address the question of axial neck pain following ACDF in the short term.

In conclusion, this data suggests that the addition of an anterior locking plate does not significantly reduce axial neck pain in the short-term postoperative period, except at the day 7 mark. The potential for a reduced requirement for postoperative analgesia in the plated group would therefore be minimal. The author does not support the anecdotal theory that the addition of a plate with anterior cervical surgery significantly reduces axial neck pain in the short term.

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