



ANALYSIS OF SURGICAL OUTCOME AND COMPLICATIONS AFTER ANTERIOR CERVICAL DISCECTOMY AND FUSION WITH ANTERIOR CERVICAL PLATES

Neurosurgery

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ABSTRACT

Introduction: Anterior cervical discectomy and fusion (ACDF) is widely accepted as an effective treatment of various cervical spine abnormality such as spondylosis, herniated discs, fractures, and neoplastic lesion. The usual outcome is quite satisfactory, however occasional complications can be troublesome and rarely catastrophic. Meticulous knowledge of potential intraoperative and postoperative complications is of paramount importance to avoid them whenever possible, as well as to manage them successfully and safely when they are inevitable. **Objectives:** To evaluate the efficacy of ACDF in relief of pre-operative symptoms using Odom Criteria and Neck Disability Index and to study the complications, possible predictors, and risk factors for complications. **Material and Methods:** A retrospective review of ACDF operations at tertiary care hospital of GGH, Kakinada under the Department of Neurosurgery. The patients were evaluated with pre-operative clinical examination, dynamic radiographs of cervical spine and MRI cervical spine. Post-operative assessment was done with clinical examination, cervical spine radiographs, Odom Criteria and Neck Disability Index. **Results:** Total 54 patients underwent ACDF during the study period. The most common indication for surgery was spinal degenerative diseases followed by traumatic cervical injuries and herniated disc with one case of neoplastic etiology. Most common presenting symptoms were unremitting pain, weakness, and radiculopathy. The mean hospital stay was 14 days (range 8–34 days). Post-operative complications were divided into major like graft migration and implant failure and minor like surgical site infection and persistent pain. Majority of patients (45 out of 54- 83%) had no complaints referable to cervical disease and were able to carry out their activities of daily living without impairment. In 71% participants surgery was able to achieve normal alignment with correction of instability. **Conclusion:** The rate of symptomatic improvement after ACDF is high and complications are usually minor but very rarely can be life threatening. Careful selection of the patients who may benefit from the surgery and meticulous surgery with adequate post-operative care are necessary to achieve the desired result.

KEYWORDS

ACDF, Cervical spine, Discectomy

Introduction

Anterior cervical discectomy and fusion (ACDF) is one of the commonly performed spinal procedures. ACDF is widely accepted as an effective treatment on a various spinal cervical abnormality such as spondylosis, herniated discs, and fractures. [1] The usual outcome is quite satisfactory in majority of cases. However, occasional complications can be troublesome and rarely catastrophic. Meticulous knowledge of potential intraoperative and postoperative ACDF related complications is of paramount importance to avoid them whenever possible, as well as to manage them successfully and safely when they are inevitable.

Objectives

- To evaluate the efficacy of ACDF in relief of pre-operative symptoms using Odom Criteria and Neck Disability Index.
- To study the possible complications and their predictors and risk factors for complications.

Material and Methods

A retrospective review of ACDF operations at tertiary care hospital of GGH, Kakinada under the Department of Neurosurgery from January 2021 to January 2022 were reviewed retrospectively. The patients were evaluated with pre-operative clinical examination, dynamic radiographs of cervical spine and MRI cervical spine. Post-operative assessment was done with clinical examination, cervical spine radiographs, Neck Disability Index after 1 month. [3] Odom Criteria at the end of 3 months post operatively [2].

Generalized Odom criteria (Table-1) has been considered a consistent and effective tool for assessment of outcome after spinal, especially

cervical surgery. It is calculated taking two important aspects into the consideration, namely improvement in preoperative symptoms and ability to return to routine life. The surgeon rates the outcome after surgery on a simple scale of 1-4, from “poor” to “excellent.”

Table-1. Generalized Odom Criteria

Score	Rating	Description
1	Excellent	No symptoms related to cervical disease. Able to perform daily activities without limitations
2	Good	Moderate symptoms related to cervical disease. Able to perform daily activities without significant limitations
3	Satisfactory	Slight improvement in symptoms related to cervical disease. Significant limitations in daily activities
4	Poor	No improvement in, or aggravation of, symptoms related to cervical disease. Not able to perform daily activities

Another index used in the study was Neck Disability Index (NDI) (Table-2) which was developed as a modification of the Oswestry Low Back Pain Index and has shown considerable consistency and reliability in various trials. NDI was calculated producing a

questionnaire with patient's response ranging from 1 to 5 in 10 major domains of daily activity. The total score was calculated by adding sum of scores out of 50 which can be doubled up to express as percentage. In present study, we have expressed NDI as a percentage score, higher the score, more is the disability.

Neck Disability Index

Table-2. Neck Disability Index

Sr. No.	Activity	Score	Final Score
Section 1	Pain intensity	1-5	10 to 50
Section 2	Personal Care (Washing, Dressing, Feeding oneself etc.)	1-5	
Section 3	Lifting	1-5	
Section 4	Reading	1-5	
Section 5	Headaches	1-5	
Section 6	Concentration	1-5	
Section 7	Work	1-5	
Section 8	Driving	1-5	
Section 9	Sleeping	1-5	
Section 10	Recreation	1-5	

Results

Total 62 patients underwent ACDF during the study period. Out of 62 one patient died in post-operative period and 7 patients did not report for follow up. Total 54 patients were followed up and data collected.

There are conflicting data regarding gender distribution of cervical spine diseases, with most of studies suggesting a male preponderance, probably attributed to more exposure to trauma and small canal/body ratio in men.[4] In our study 75.9 % (41/54) patients were male and 24.1% (13/54) female. Figure- 1.

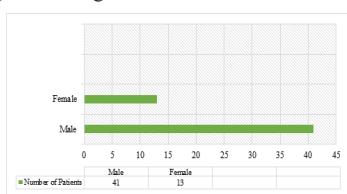


Figure-1. Sex Distribution of patients undergoing ACDF

Cervical spine degenerative changes are more common among elderly while incidence of trauma to cervical spine is more in young and middle age population. The most affected age group in our study was 41-50 years bearing the brunt of trauma as well as degenerative disease. Figure- 2.

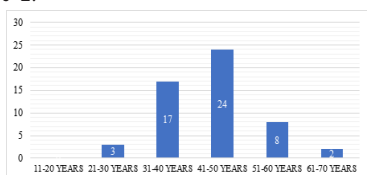


Figure-2. Age Distribution of Patients

Trauma to cervical spine and resultant instability was the most common indication for surgery, followed by spinal degenerative disease. Most common presenting symptoms were pain, weakness, and tingling sensation with or without numbness. Figure-3.

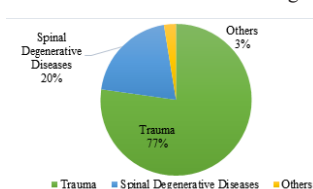


Figure: 3. Indications for surgery

The mean hospital stay was 14 days (range 8–34 days) which can be partially attributed to the requirement of fulfilling discharge prerequisites under the state sponsored health scheme.

Figure- 4.

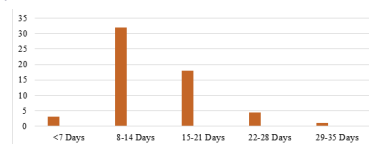


Figure: 4. Post-operative Hospital Stay

Post-operative complications were divided into major like graft migration and implant failure, and minor complication like surgical site infection and persistent pain. Majority of patients, 87% (47/54) had no complaints referable to cervical disease and were able to carry out their activities of daily living without impairment. In 71% participants surgery was able to achieve normal alignment with correction of instability.

The overall complication rate of ACDF surgery has been reported to be 1.7 to 13% in various studies. In one study by Timothy et. al. rates of different complications were described as follows: dysphagia 5.3%, esophageal perforation 0.2%, recurrent laryngeal nerve palsy 1.3%, infection 1.2%, adjacent segment disease 8.1%, pseudarthrosis 2.0%, graft or hardware failure 2.1%, cerebrospinal fluid leak 0.5%, hematoma 1.0%, Horner syndrome 0.4%, C5 palsy 3.0%, vertebral artery injury 0.4%, and new or worsening neurological deficit 0.5%.[5] In our study, the most common complication was found to be graft donor site infection 9.2% (5/54) which was right iliac crest in all cases. Second most common complication encountered was seroma formation 7.4% (4/54) with clear serous collection and negative culture report. Neck wound infection occurred in only one patient 1.8% (1/54) which is comparable to most studies published till date. Implant failure occurred in one patient which was promptly managed by re-exploration and patient recovered well. Figure-5.

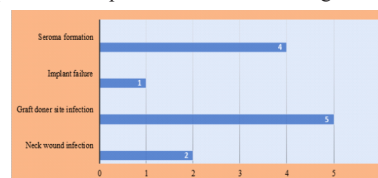


Figure- 5. Post-operative Complications

Neck disability index (NDI) was calculated for all the participants at follow-up visit after one month. Figure-6. Majority of patients had improvement in NDI score by 16-20 (32%-40% change in score).

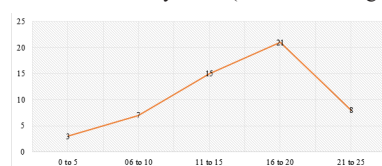


Figure- 6. Change in NDI after Intervention

Follow up after 3 months of surgery was done using Odom's score. 64.8% (35/54) patients could achieve Odom score of 1 and were able to carry out their routine life. Figure-7.

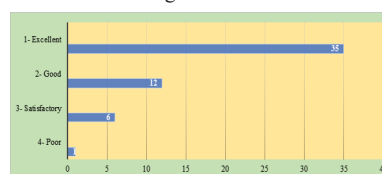


Figure- 7. Odom Score at follow-up visit after 3 months.

Conclusion

ACDF with anterior cervical plate fixation is an effective treatment for many cervical conditions like degenerative diseases, traumatic disc herniation and neoplastic condition causing instability. The rate of symptomatic improvement after the surgery is high and statistically significant. Complications are usually minor but very rarely can be life threatening. Careful selection of the patients who may benefit from the surgery and meticulous surgery with adequate post-operative care are

necessary to achieve the desired result.

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