

Clinical presentation and outcome after anterior cervical discectomy and fusion for degenerative cervical disc disease

ABSTRACT

Background: Anterior cervical discectomy and fusion (ACDF) is a well-described surgical approach for symptomatic degenerative cervical disc disease which does not respond to conservative management. In the present study, we assessed clinical presentation and outcomes of ACDF.

Materials and Methods: The present study was conducted from October 1, 2015, to October 31, 2017, in the Department of Neurosurgery, Narayana Medical College and Hospital, Nellore, Andhra Pradesh, among 100 consecutive adult patients who underwent single- or two-level ACDF for degenerative cervical disc disease.

Results: The mean age was 47.2 ± 12.8 years (range: 20–74 years). Majority of the patients were male (86/100). Presenting symptoms were neck pain (77%), limb weakness (73%), paresthesias (53%), radicular pain (49%), stiffness in limbs (16%), and bladder involvement (13%). Fusion was done with stand-alone titanium cage/bone graft or titanium cage/bone graft with anterior cervical plate. At the time of discharge, significant improvement in preoperative symptoms (neck pain [47/77-61%], radicular pain [31/49-63%], limb weakness [53/73-72.6%], paresthesias [44/53-83%], stiffness in limbs [13/16-81%], and bladder symptoms [8/13-61%]) was reported by majority of these patients. Majority of these patients also reported improvement in preoperative sensory deficits at the time of discharge. Postoperative complications were hoarseness of voice (22%), dysphagia (16%), deterioration of motor power (8%), and postoperative hematoma (7%).

Conclusions: A significant proportion of patients with degenerative cervical disc disease show remarkable recovery after ACDF.

Keywords: Anterior cervical discectomy, cervical radiculopathy, fusion

INTRODUCTION

Cervical pain associated with cervical degenerative disc disease can be incapacitating and can compromise the quality of life. It has been shown that on magnetic resonance imaging, many adults can have cervical degenerative disc disease without any associated clinical symptoms.^[1,2] Conservative management is the initial preferred management for symptomatic patients with degenerative cervical disc disease. Majority of the patients respond well to conservative management.^[3] Anterior cervical discectomy and fusion (ACDF) has been recommended for the subgroup of patients who do not respond to the conservative management.^[4-8] In well-selected group of patients (i.e., significant radicular pain, younger age, single-level soft disc, male gender, nonsmokers, matching

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radiological and clinical findings, and well-preserved neurological functions), ACDF has been shown to be associated with good outcome.^[9,10] In the present study, we assessed clinical presentation and outcomes following ACDF for cervical degenerative disc disease.

MATERIALS AND METHODS

The present study was conducted from October 1, 2015, to October 31, 2017, in the Department of Neurosurgery, Narayana Medical College and Hospital, Nellore, Andhra Pradesh, after approval from the Institutional Ethical Committee. Hundred consecutive adult patients who underwent anterior cervical discectomy for single- or two-level discectomy with fusion for degenerative cervical disc diseases operated during this period were included in the study. Patients with traumatic spine injuries who underwent corpectomy/> 2-level discectomies were excluded from the study.

Data were entered into the Microsoft Excel sheet, and interpretation was done using statistical software SPSS Statistics Version 24.0 (IBM, Armonk, New York, USA). The data were expressed using descriptive statistics such as mean and standard deviation for continuous variables and frequency and percentage for categorical variables. Chi-square test was used to find the significance of categorical data. $P < 0.05$ was considered statistically significant.

RESULTS

Clinical and radiographic details are summarized in Table 1. The mean age was 47 years (range: 20–74 years). Majority of the patients were in the age group of 41–60 years (54%). Presenting symptoms were neck pain (77%), limb weakness (73%), paresthesias (53%), radicular pain (49%), stiffness in limbs (16%), and bladder involvement (13%). History of smoking was recorded in 35 patients and alcohol consumption in 30 patients. Most common level for degenerative cervical disc disease was C3–4 (31%). Single-level ACDF was done in 95 patients and two-level ACDF in 5 patients [Table 1]. Fusion was done with stand-alone titanium cage/bone graft or titanium cage/bone graft with anterior cervical plate. At the time of discharge, significant improvement in preoperative symptoms (neck pain [47/77-61%], radicular pain [31/49-63%], limb weakness [53/73-72.6%], paresthesias [44/53-83%], stiffness in limbs [13/16-81%], and bladder symptoms [8/13-61%]) was reported by majority of these patients. Improvement in the preoperative symptoms and new postoperative symptoms is summarized in Table 2. Majority of the patients also reported improvement in their preoperative sensory deficits [Table 3].

Table 1: Age, gender distribution, and level of cervical degenerative disease

	Number/percentage of patients*
Age (years)	
20-40	31
41-60	54
61-80	15
Sex	
Male	86
Female	14
Level of cervical degenerative disease	
C2-3	4
C3-4	29
C3-4 and C4-5	2
C4-5	17
C4-5 and C5-6	1
C5-6	21
C5-6 and C6-7	2
C6-7	24

*Values given in this column indicate both the number of patients and percentage of patients as there are 100 patients

Table 2: Evaluation of symptoms pre- and postoperatively following anterior cervical discectomy and fusion

	Postoperative*		P
	Yes	No	
Neck pain preoperative			
Yes	30	47	<0.001 (S)
No	3	20	
Radicular pain preoperative			
Yes	18	31	<0.001 (S)
No	0	51	
Limb weakness preoperative			
Yes	20	53	<0.001 (S)
No	5	22	
Tingling sensation preoperative			
Yes	9	44	<0.001 (S)
No	4	43	
Tightness in limb preoperative			
Yes	3	13	0.007 (S)
No	2	82	
Bladder involvement preoperative			
Yes	5	8	0.999 (NS)
No	7	80	

*Values given in these columns indicate both the number of patients and percentage of patients as there are 100 patients. S - Significant; NS - Not significant

Postoperative complications were hoarseness of voice (22%), dysphagia (16%), deterioration of motor power (8%), and postoperative hematoma (7%).

DISCUSSION

Cervical disc degeneration and subsequent herniation can lead to spinal cord or nerve root compression with resultant myelopathy and/or radiculopathy. Cervical degenerative disc

Table 3: Evaluation of sensory deficits in the upper and lower limbs pre- and postoperatively following anterior cervical discectomy and fusion

	Preoperative sensory deficits*	Postoperative sensory deficits*		P
		Yes	No	
Right upper limb	Yes (13)	2	11	0.481 (NS)
	No (87)	7	80	
Right lower limb	Yes (11)	1	10	0.454 (NS)
	No (89)	6	83	
Left upper limb	Yes (15)	1	14	0.191 (NS)
	No (85)	7	78	
Left lower limb	Yes (10)	0	10	0.453 (NS)
	No (89)	6	83	

*Values given in these columns indicate both the number of patients and percentage of patients as there are 100 patients. S - Significant; NS - Not significant

disease is most commonly reported in middle-age group (35–55 years).^[11,12] Majority of the patients in this study were in the age group of 41–60 years. Increasing age has been shown to be associated increased risk of 30-day postoperative complications and also is an independent risk factor for increased morbidity and increased stay in hospital.^[13-16] Males are more prone to develop cervical degenerative disc disease.^[17-24] Higher incidence of spondylosis changes in population with increasing age and in males was reported by Sasaki *et al.*^[18] Higher incidence of cervical degenerative disc disease in males was also reported by Hukuda and Kojima.^[19] Indian studies have also reported that age and gender are important risk factors for having cervical spondylosis. In our study, majority of the patients were male (86%) and in the age group of 41–60 years (54%). The most frequently levels for cervical disc herniation to occur are C4/5, C5/6, and C6/7.^[11] However, in our study, majority of the patients (31/100%–31%) had degenerative disc disease at C3–4 level.

Smoking is an important risk factor for cervical disc degeneration and can also affect the postoperative outcome.^[25-30] Grisdela *et al.* found that patients who were smokers had cervical disc degeneration (with or without myelopathy) more frequently and at younger age than those who did not smoke.^[30] Smoking increases the rate of perioperative complications such as infection, adjacent segment disease, and dysphagia.^[25-29] Smoking adversely affects bony fusion and increases the chances of pseudoarthrosis.^[25-30] Thus, it is mandatory to know the smoking habit of the patient with cervical disc degeneration before surgery. Measures such as nicotine replacement therapy and use of bone morphogenetic proteins during surgery can be considered to improve the outcome after surgery. Alcohol use is associated with increased risk of degenerative cervical disc disease and its consequences.^[15] Alcohol intake can be dangerous in patients with cervical degenerative disc disease with canal stenosis as

cervical spine may not be properly supported after alcohol intake due to the muscle relaxant action of alcohol.^[15]

Postoperative complications ranging from 4.4% to as high as 20% are reported following ACDF.^[31-36] Postoperative complications following ACDF reported include injury to esophagus/trachea/vascular/neural structures, wound hematoma, wound infection, bone graft extrusion, instrumentation failure, pseudoarthrosis, etc.^[29,37-41] Various immediate postoperative complications observed in this study were hoarseness of voice, dysphagia, local infection, wound hematoma, transient motor power deterioration, and radicular pain.^[42] Tsuzuki *et al.*^[43] reported that C5 radiculopathy may occur after both anterior and posterior approaches to the cervical spine. Infection rates following ACDF were low (may be due to rich vascular supply); however, literature suggest that poor surgical technique and inadequate wound care can increase the risk of wound infection.^[32,44-47] The most dreaded complication associated with anterior cervical spine surgery is wound hematoma (incidence ranges from 0.2% to 1.9%) which can result in potentially fatal airway compromise.^[48-52] In the present study, we used drain for at least initial 24 h following surgery to avoid this potentially fatal complication. Majority of the patients report a significant improvement in preoperative symptoms such as neck pain, radicular pain, and motor/sensory deficits following ACDF.^[53-57] However, few patients may report new symptoms (such as neck/radicular pain and paresthesias, which were not present preoperatively) after ACDF, as also noted in the present study.^[53-57] Majority of these postoperative symptoms respond well to conservative treatment.^[53-57]

CONCLUSIONS

A significant proportion of patients with degenerative cervical disc disease show remarkable recovery after ACDF.

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Conflicts of interest

There are no conflicts of interest.

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