

# Anterior Cervical Discectomy and Fusion Using Anterior Iliac Crest Autologous Bone, Anterior Cages, and Anterior Spinal Instrumentation: Outcomes in Private Practice Application

A W Gillespy, M C Gillespy, B Wivholm

## Citation

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## Abstract

Study Design. Retrospective review.

Objective. To evaluate private practice application of anterior cervical discectomy and fusion (ACDF) surgery using autologous anterior iliac crest bone, anterior cage, and anterior spinal instrumentation for treatment of symptomatic cervical disc disease.

Summary of Background Data. ACDF using autologous iliac crest bone is frequently used to treat patients with cervical disc disease. However, there are limited data on outcomes of private practice use of ACDF with autologous bone, cage, and plate, and few studies that included 3- and 4-level fusions.

Methods. 308 consecutive patients with cervical radiculopathy and/or spondylosis underwent ACDF with autograft, cage, and plate via a modified Smith-Robinson technique, including one-, two-, three-, and four-level fusions.

Results. Clinical and radiographic follow-up showed that the fusion rate was 99.4% (467 out of 470 total levels). Mortality rate was 0%, and overall morbidity was 4.5%. Complications included three non-unions, two instrumentation failures, two isolated pelvic fractures that healed spontaneously, and residual hip pain in one patient.

Conclusions. The private practice use of ACDF with autologous bone graft, cage, and instrumentation can provide high success rates and few complications.

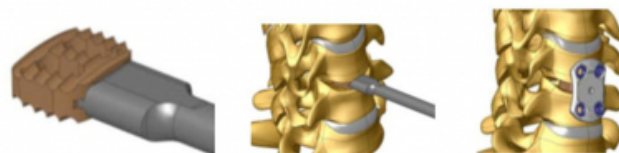
## Key Points:

Private practice use of anterior cervical discectomy and fusion (ACDF) using autologous anterior iliac crest bone, cage, and plate in single- and multi-level fusions had a high rate of success and few complications.

## INTRODUCTION

Anterior cervical discectomy and fusion (ACDF) using anterior iliac crest autologous bone is the traditional technique for arthrodesis of the cervical spine, the standard of care for patients with symptomatic cervical disc disease who are unresponsive to conservative medical care [3-9]. Anterior surgical approach to the spine and technique for ACDF was developed in the late 1950's [1, 2]. Precise fit and fill of the interspace, in conjunction with construct compression, are key elements of the technique. Figure 1.

Figure 1



However, there are limited data on private practice use of autologous bone graft with a cage and plate, and few studies that included 3- and 4-level fusions. The present

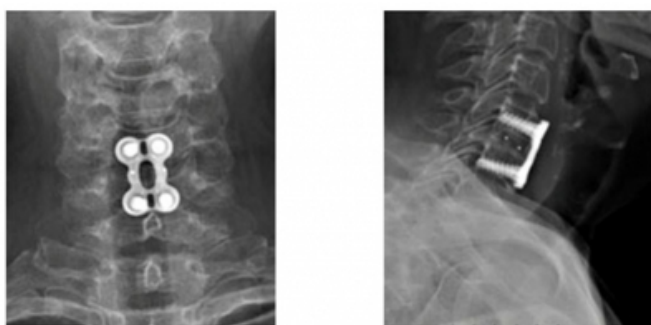
retrospective review evaluated clinical and radiographic outcomes of private practice ACDF surgeries using autologous iliac crest bone, anterior cages, and anterior spinal instrumentation.

## MATERIALS AND METHODS

During 2005-2012, 308 consecutive patients (55.4% male, 44.6% female; average age, 53.7 years) with cervical radiculopathy and/or spondylosis underwent ACDF surgery through a private practice in Daytona Beach, FL. Comorbidities included 106 smokers, 28 diabetics, 8 previous surgeries, and 1 trauma patient. The ACDF surgeries included 159 one-level, 137 two-level, 10 three-level, and 1 four-level fusions (470 total levels), at various locations (30 C3-4, 92 C4-5, 209 C5-6, 138 C6-7, 1 C7-T1). Figures 2-4

**Figure 2**

1 level ACDF AP and lateral films taken at 11 months post-op demonstrating solid arthrodesis.



**Figure 3**

2 level ACDF AP and lateral films taken at 12 months post-op demonstrating solid arthrodesis.



**Figure 4**

3 level ACDF AP and lateral films taken at 12 months post-op demonstrating solid arthrodesis.



Each surgery involved the use of autologous iliac crest bone, anterior cage, and anterior spinal instrumentation.

Autologous iliac crest bone graft was harvested percutaneously with cylindrical cutting devices between 11 and 8 gauge. A single cortical window allowed access for cores of cancellous bone to be harvested to fill the cage. Following surgery, patients were asked to wear an external orthosis for 2 to 8 weeks.

Operative reports, hospital and outpatient clinic charts with radiographic studies were reviewed to determine fusion rates and procedure-related complications. Average follow-up was 17.2 months (range, 0.5-93 months). Criteria for determining a failed fusion were as follows. 1) If patient had no clinical neck pain and x-rays showed solid arthrodesis, no further diagnostic studies were ordered. 2) If patient had clinical neck pain, lateral flexion and extension radiographs were used to determine if there was abnormal motion of fused segment(s). If abnormal motion was determined at any level, that level was considered a failed fusion. 3) If patient had clinical neck pain, and lateral flexion and extension x-rays showed no abnormal motion, CT scan of the cervical spine was used to determine failed fusion. Instrumentation failure was defined as breakage of the plate or a loose/broken screw. Open surgical exploration remains the “gold standard” for the diagnosis of failed fusion, but noninvasive radiographic methods of establishing the status of fusion are preferable [10,11].

## RESULTS

The surgeries resulted in no esophageal perforations or dural penetrations, but temporary partial vocal cord paralysis occurred in one patient. None of the patients had superficial or deep wound infections, and most patients felt no pain at the secondary hip surgical site on first post-operative day.

The fusion rate was 99.4% (467 fusions out of 470 levels). The mortality rate was 0%, and the overall morbidity rate was 4.5% (14 of 308 patients). There were eight complications (2.6%) related to anterior cervical spine surgery. Complications included three non-unions (at C4-5, C5-6, and C6-7), two hardware failures, one cerebrovascular accident five days post-operatively, one temporary partial vocal cord paralysis, and one post-operative C5 radiculopathy. There were six complications (1.9%) related to the anterior iliac crest donor site: three iliac crest pelvic fractures (all healed spontaneously within six weeks with no residual pain), one cellulitis resolved with oral antibiotics, one numbness in the lateral femoral cutaneous nerve distribution, and one case of persistent anterior iliac crest pelvic pain.

## DISCUSSION

Private practice application of ACDF using autologous iliac crest bone, cages, and spinal instrumentation can provide high fusion rates with few complications. Management of the complications that did occur was successful in the vast majority of the cases reviewed. Overall, ACDF surgery resulted in dramatic improvements in pain, disability, and quality of life, with low adverse event rates. Thus, the application of ACDF procedures using autologous iliac crest bone graft, anterior cage, and spinal instrumentation in private orthopedic practice offers a number of advantages.

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**Author Information**

**Albert W. Gillespy, MD**

Orthopedic Clinic of Daytona Beach  
Daytona Beach, FL  
agillespy@orthodb.com

**Mark C. Gillespy, MD**

Orthopedic Clinic of Daytona Beach  
Daytona Beach, FL

**Brooke Wivholm, PA-C**

Orthopedic Clinic of Daytona Beach  
Daytona Beach, FL