Available online at www.sciencedirect.com

ScienceDirect

International Journal of Spine Surgery 7 (2013) e84–e87

ISASS INTERNATIONAL SOCIETY for the ADVANCEMENT of SPINE SURGERY
www.sasjournal.com

Safety and feasibility of outpatient ACDF in an ambulatory setting: A retrospective chart review

William C. Tally, MD*, Sanjiwan Tarabadkar, MD, Boris V. Kovalenko, BS

Athens Orthopedic Clinic, Georgia Health Sciences University/University of Georgia Medical Partnership, Athens, GA

Abstract

Background: Outpatient spinal surgery is becoming increasingly common and in some areas is now the preferred course for certain procedures. Many different procedures, including ACDF, have been examined in the outpatient setting in the past few years but to our knowledge none have included the ambulatory setting.

Methods: All ACDF procedures performed during the time frame of the study were included. Charts were pulled and evaluated using the outcome measures. One and two-level ACDF were divided into respective cervical levels and individually analyzed.

Results: Single level ACDF comprised 62% (n = 74) of the total surgeries. Single level ACDF patients averaged a total hospital stay time of 4.7 hours, with a maximum total stay time of 8.2 hours and a minimum stay time of 0.8 hours. Two-level ACDF made up 38% (n = 45) of the total surgeries. The average total stay time for two level ACDF was 5.4 hours, with a maximum time of 9.6 hours and a minimum of 3.4 hours. All patients were comparable in age and gender. There were no major operating complications and neither re-admissions nor deaths after discharge. There were two transfers from ambulatory surgical centers to inpatient status for observation only.

Conclusions: Outpatient one and two-level ACDF with plate fixation can safely be done on an outpatient ambulatory basis. The data suggest that all subaxial cervical levels can be treated. Patient fusion and satisfaction data were not obtained and thus cannot be commented upon.

Clinical relevance: Ambulatory ACDF should be considered as a feasible option for reducing hospital stay as well as the associated healthcare costs.

Keywords: ACDF; Ambulatory; Feasibility

Introduction

Anterior cervical discectomy and fusion (ACDF) has long been used to treat a variety of disorders in the cervical spine. Over the past several years, spinal surgery has been increasingly done on an outpatient basis, and ACDF is no exception. With the constant rise in medical costs and the mounting number of procedures, specialized outpatient surgeries are becoming a progressively larger part of surgical practices.[1,2] Owing to the advancement in outpatient surgical centers, anesthesia, and surgical techniques, outpatient spine surgeries are becoming a preferred method of treatment for both physicians and patients in many locations. The resulting shorter total time in facility and quicker return to home has been demonstrated by Villavicencio et al.[3] Reported hospitalization times for the ACDF procedure range from 20 to 96 hours when not done on an outpatient basis.[3] Ambulatory care seeks to drastically reduce postoperative hospitalizations and increase patient satisfaction. Studies have proven that other spinal surgeries are safe and cost-effective when done in an outpatient setting[4,5]; specifically, outpatient lumbar discectomy and cervical laminoforaminotomy have produced good results.[6] As ACDF is a common surgical procedure for degenerative disc disease and herniated discs, its feasibility as an ambulatory procedure should be examined. Our study seeks to expand on this current literature by dealing with the largest volume of outpatient patients with ACDF, adding the ambulatory setting, and evaluating safety based on the surgical level addressed.

Methods

A retrospective chart review of all patients who underwent single- or two-level ACDF between June 2004 and January 2008 in a physician-owned ambulatory surgery

* Corresponding author: William C. Tally, MD, 1811 Wild Azalea Lane, Athens, GA, 30606; Tel.: +1-706-286-0086.
E-mail address: tallyspine@gmail.com

2211-4599 © 2013 Published by Elsevier Inc. on behalf of ISASS – The International Society for the Advancement of Spine Surgery.
http://dx.doi.org/10.1016/j.ijsp.2013.06.001

center was performed. Data extracted from the charts included the age, gender, date of surgery, indication, surgery level, graft and plate, surgical times, anesthesia time, ambulatory stay time, and complications. The charts also included the clinic notes and these were examined for any evidence of postoperative readmission and complications. All surgeries were done between the C4-C5 and C7-T1 disc spaces. All patients underwent anterior ACDF via the Smith-Robinson approach. Implant choice was based on surgeon preference and included PEEK, allograft with or without local autograft. All patients received anterior plating with system based on surgeon preference. All surgeries were done in the ambulatory surgery center at a privately held orthopedic clinic in Savannah, Georgia. All surgeons were orthopedic fellows trained in spinal surgery.

Clinical progress notes were followed up for up to 1 year and a minimum of 3 months postoperatively to assess postoperative complications requiring readmission. Anesthesia times, surgical times, and total hospital times were averaged both for single- and two-level ACDF as a group, and at each level individually to see if ACDF could safely and efficiently be accomplished in an ambulatory setting.

We performed 119 procedures (66 in males and 53 in females) on patients with ages ranging from 21 to 64 years with an average age of 45 years. The single-level procedures performed involved the C4-C5 disk space in 6 patients, C5-C6 in 39, C5-C6 in 26, and C7-T1 in 3 (total 74 patients). The 2-level procedures involved C4-C5 and C5-C6 in 16 patients and C5-C6 and C6-C7 in 29 (total 45 patients).

Surgical procedure

All patients met with an anesthesiologist for preoperative examination and treatment, and were deemed safe for ambulatory general anesthesia. During the surgical procedure, the patient was placed in the supine position, shoulders taped and no traction applied. Intraoperative fluoroscopy was employed for incision localization, level confirmation and to ensure good hardware position. The approach side varied by surgeon preference and exposure was via the Smith-Robinson approach. Hemostasis was ensured at closure and no drains were applied. The patients were then transferred to the postoperative anesthesia recovery unit for observation and discharge.

Results

A total of 119 patients underwent anterior cervical discectomy and fusion. Most of the patients were male (55.4%) with a mean age of 44.6 years (range: 21–64 years). Females comprised 44.6% of the patients with a mean age of 46.6 years (range: 28–61 years). We performed 60% of the procedures to treat cervical disc herniations, 18% for radiculopathy secondary to spondylosis, and 22% for a spondylolisthesis or combination of spondylolisthesis and spondylosis.

Single-level ACDF comprised 62% (n = 74) of the total surgeries. For single-level ACDF, the mean anesthesia time

Table 1
Mean and ranges for anesthesia, surgical, and hospital stay times for both single- and two-level ACDF

Level	Mean anesthesia time (hours)	Minimum anesthesia time (hours)	Maximum anesthesia time (hours)	Mean surgical time (hours)	Minimum surgical time (hours)	Maximum surgical time (hours)	Mean stay time (hours)	Minimum stay time (hours)	Maximum stay time (hours)	Total number
Single level	2	1.3	3.0	1.3	0.8	2.5	4.7	2.7	8.2	74
Two level	2.3	1.7	3.5	1.6	1.2	2.5	5.4	3.4	9.6	45

Table 2
Mean and ranges for anesthesia, surgical, and total hospital stay times for single-level ACDF

Level	Mean anesthesia time (hours)	Minimum anesthesia time (hours)	Maximum anesthesia time (hours)	Mean surgical time (hours)	Minimum surgical time (hours)	Maximum surgical time (hours)	Mean stay time (hours)	Minimum stay time (hours)	Maximum stay time (hours)
C4-C5	1.9	1.5	2.2	1.3	1.0	1.5	4.4	3.3	6.0
C5-C6	2.0	1.3	3.0	1.3	0.8	2.6	5.0	2.7	8.2
C6-C7	2.0	1.5	2.6	1.3	0.9	1.8	4.7	3.3	6.5
C7-T1	2.0	1.8	2.3	1.4	1.1	1.5	4.8	3.7	6.0

Table 3
Mean and ranges for anesthesia, surgical, and total hospital stay times for multilevel ACDF

Level	Mean anesthesia time (hours)	Minimum anesthesia time (hours)	Maximum anesthesia time (hours)	Mean surgical time (hours)	Minimum surgical time (hours)	Maximum surgical time (hours)	Mean stay time (hours)	Minimum stay time (hours)	Maximum stay time (hours)
C4-C5 and C5-C6	2.2	1.7	2.7	1.5	1.2	2.0	5.0	3.5	6.8
C5-C6 and C6-C7	2.4	1.7	3.5	1.7	1.2	2.5	5.8	3.4	9.6

was 2 hours, mean surgical time was 1.3 hours, and average total hospital stay time was 4.7 hours. Two-level ACDF made up 38% (n = 45) of the total surgeries. The mean anesthesia time for 2-level ACDF was 2.3 hours; mean surgical time was 1.6 hours; and average total stay time was 5.4 hours. The associated ranges for these data are shown in Table 1.

The mean anesthesia, surgical, and total stay times for the individual single- and multilevel ACDFs are shown in Tables 2 and 3.

Out of all 119 outpatient ACDFs, there were only 2 complications during the surgical procedure that required patients to be transferred from an outpatient to inpatient status. One patient was transferred for overnight observation secondary to excessive blood loss from inadvertent avulsion of the inferior thyroid artery at the carotid. The second patient was transferred for overnight observation for what was deemed at the time of wound closure to be excessive soft tissue swelling leading to concerns about continued swelling postclosure. There was no concern in the second patient for hematoma as the swelling was visualized before closure. Both patients were subsequently discharged the next morning having had no further issues. There were no readmissions or deaths due to patients' cervical surgery.

Discussion

The current literature on outpatient anterior cervical discectomy does not examine the difference in surgical times and hospital stay across different levels of the neck. Further, no published study has examined ambulatory ACDF. Our study involves a higher outpatient volume than any previous publication, adds an ambulatory setting variable and breaks down the patients by surgical level. The low total hospital stay time, which is defined as the time from which the patient begins the preoperative procedures to the time of discharge, along with other published literature for both single- and two-level ACDF, shows that ACDF can effectively be performed on an outpatient basis. Villavicencio et al.[3] showed that patients undergoing single- or two-level ACDF were discharged less than 15 hours after their surgery. This study, with a mean hospital stay time of 5.0 hours (range: 2.3–9.6 hours), shows all patients being discharged within 10 hours, regardless of whether it was single- or two-level ACDF and irrespective of the level being operated on. This is a vast improvement on the inpatient mean hospitalization stay of 2.5 days shown by Erickson et al.[6] In addition, only 2 of the 119 patients on whom we performed surgery had minor complications during the surgical procedure requiring hospital observation; this not only shows that ACDF can be done quickly and efficiently, but it is also a safe procedure. These findings are consistent with the established literature, showing that outpatient ACDF is just as safe as inpatient ACDF.[7,8] At the time of patient encounters described in this data, it was our practice to use no drainage. Despite the lack of any postoperative bleeding complications, we have instituted the use of a Penrose drain in all patients. This drain is pinned to the dressing and removed by the patient the morning of postoperative day 1. This has been initiated purely for the peace of mind of the surgeon, nurses, and patient. None of our patients presented with any complications during the 1 year for which they were followed up.

In addition to outpatient ACDF shortening the hospitalization time for patients and reducing their exposure to nosocomial infections, it could also be a money-saving practice for both physicians and hospitals.[9,10] There are already well-established studies that have identified outpatient ACDF as a cost-efficient procedure. Specifically, studies have shown the cost of inpatient single- or two-level ACDF to be between $6739 and $15,000.[3,11,12] Erickson et al.[6] demonstrated savings between $4000 and $8000 when they compared inpatient ACDF with outpatient ACDF.

This study confirms much of the research on both outpatient spinal surgery in general, and specifically, outpatient ACDF. Although the literature shows that ambulatory ACDF can be done effectively, our study specifically examines the individual cervical levels so as to gain a better understanding of the safety and practicality of outpatient ACDF. Not only does ambulatory ACDF decrease hospitalization time for patients, but it also is a very cost-effective method for both hospitals and physicians.

References

1. Canizares M, MacKay C, Davis AM, Mahomed N, Badley EM. A population-based study of ambulatory and surgical services provided by orthopaedic surgeons for musculoskeletal conditions. *BMC Health Serv Res* 2009;(9):56.
2. Gray DT, Hollingworth W, Onwudiwe N, et al. Costs and state-specific rates of thoracic and lumbar vertebroplasty. *Spine* 2008;33 (17):1905–12.
3. Villavicencio AT, Pushchak E, Burneikiene S, et al. The safety of instrumented outpatient anterior cervical discectomy and fusion. *Spine J* 2007;7(2):148–53; [Epub 2006 Nov 13].
4. An HS, Simpson JM, Stein R. Outpatient laminotomy and discectomy. *J Spinal Disord* 1999;12(3):192–6.
5. Newman MH. Outpatient conventional laminotomy and disc excision. *Spine* 1995;20(3):353–5.
6. Erickson M, Fites BS, Thieken MT, et al. Outpatient anterior cervical discectomy and fusion. *Am J Orthop* 2007;36(8):429–32.
7. Liu JT, Briner RP, Friedman JA. Comparison of inpatient vs. outpatient anterior cervical discectomy and fusion: A retrospective case series. *BMC Surg* 2009;9:3.
8. Tumialán LM, Pan J, Rodts GE, et al. The safety and efficacy of anterior cervical discectomy and fusion with polyetheretherketone spacer and recombinant human bone morphogenetic protein-2: A review of 200 patients. *J Neurosurg Spine* 2008;8(6):529–35.
9. Stieber JR, Brown K, Donald GD, et al. Anterior cervical decompression and fusion with plate fixation as an outpatient procedure. *Spine J* 2005;5(5):503–7.
10. Silvers HR, Lewis PJ, Suddaby LS, et al. Day surgery for microdiscectomy: Is it safe and effective? *J Spinal Disord* 1996;9(4): 287–93.
11. Castro Jr FP, Holt RT, Majd M, et al. A cost analysis of two anterior cervical fusion procedures. *J Spinal Disord* 2000;13(6):511–4.
12. Chi JH, Ames CP, Tay B. General considerations for cervical arthroplasty with technique for ProDisc-C. *Neurosurg Clin N Am* 2005;16(4):609–19.