Outpatient Anterior Cervical Discectomy and Fusion

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Abstract

The study reported here examined patient safety and satisfaction in 56 patients with cervical radiculopathy secondary to foraminal stenosis or a herniated disc who underwent a total of 58 outpatient anterior cervical discectomy and fusion (ACDF) procedures with iliac crest bone graft or fibular allograft. Patients were discharged 0.8 hour to 6.5 hours (mean, 2.4 hours) after surgery and received 3 home health care visits over 24 hours. Of the 45 satisfaction questionnaires that were completed, 43 (95.6%) indicated patients were satisfied or very satisfied with the surgery, and 35 (77.8%) indicated patients would have the procedure performed on an outpatient basis again. Eleven (19.6%) of the 56 patients did not respond to a satisfaction questionnaire. Outpatient ACDF has high patient satisfaction but does not compromise patient safety.

Anterior cervical discectomy and fusion (ACDF) was first performed by Bailey and Badgley in 1952.[1-4] The anterior approach to the cervical spine has been increasing in popularity as a means of achieving cervical nerve root and spinal cord decompression. It provides a technically simple and safe dissection, a low complication rate, a high fusion rate, immediate postoperative stability, and low postoperative morbidity.[1-9] Major complications are rare but potentially disastrous and include vertebral artery injury, pharyngeal edema or hematoma causing respiratory difficulty, neurologic injury, and esophageal perforation.[9-12] Other complications have been reported but are generally transient and minor in nature. These include dysphagia, dysphonia, hoarseness, and scar formation. Wound infection is always a concern. Another potential complication is iliac crest donor-site pain when autogenous bone graft is used for fusion.[2,7,9,13] Multiple studies have reported good to excellent ACDF outcomes (range, 67%-94%).[2-5,7,9,13-16]

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The number of procedures performed with limited hospital stays or on an outpatient basis is growing. Microlumbar discectomy was first reported in 1985[17]; other reports followed.[18-20] Outpatient lumbar discectomy has produced good results.[21] Outpatient cervical laminoforaminotomy has also been studied and appears safe.[22] The simplicity, safety, effectiveness, low morbidity, and low rate of complications associated with ACDF, in conjunction with the trend toward outpatient care, suggest the potential that ACDF has to become an outpatient procedure. In the study reported here, we examined the safety and midterm results of ACDF performed on an outpatient basis.

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Study Design

Fifty-six consecutive patients (31 men, 25 women) had a total of 58 ACDFs performed by Dr. McGee in an ambulatory surgery center (ASC) between October 1993 and September 1996. Of these 58 ACDFs, 56 were 1-level, and 2 were 2-level. Mean age was 41.8 years (range, 31-58 years). Comorbidities included history of alcohol abuse, history of panic attacks, mitral valve prolapse with regurgitation, hypertension, coronary artery disease, asthma, irritable bowel syndrome, and history of pancreatitis. Twenty-two (37.9%) of the 58 ACDFs involved worker's compensation.

Indications for surgery were cervical radiculopathy, with or without neck pain, caused by foraminal stenosis or herniated disc documented by diagnostic studies including magnetic resonance imaging (MRI), myelogram, and computed tomography (CT). These diagnostic studies were used to define pathology and anatomy for surgical planning as well. In all cases, nonsurgical therapy (≥2 weeks) had failed; this therapy included a combination of nonsteroidal anti-inflammatory drugs, steroids (oral or epidural), physical therapy, cervical traction, exercise, and rest. Surgery was not performed for mechanical neck pain alone. Preoperative evaluation included history taking, physical examination, laboratory studies, cervical

spine plain x-rays, MRI, CT myelography, and electromyography with nerve conduction. Risks and benefits of fibular allograft versus iliac crest bone graft (ICBG) were discussed with the patient, and the patient chose the graft source. Of the 58 ACDFs, 36 (62.1%) were performed with ICBG; the other 22 (37.9%) were performed with fibular allograft. Patients were not excluded for age, weight, or stable medical condition. Patients were excluded from outpatient treatment for multilevel ACDF (except 2 patients who felt strongly about outpatient ACDF; an attempt was made to keep their operative time to <1 hour); comorbidities necessitating postoperative inpatient monitoring; no reliable at-home caregiver; insurance reasons; excessive distance from Fort Wayne, Indiana (>1 hour driving) or lack of transportation; and patient wishes.

Using these exclusion criteria, approximately 200 patients were excluded from having outpatient ACDF performed during the 35-month study period. Thus, approximately 20% of the ACDFs that were performed during this period were performed on an outpatient basis, and these were included in the study.

Patients were asked to arrive at the ASC 90 minutes before scheduled surgery. All surgeries were performed under general endotracheal anesthesia using a standard left anterior cervical approach.[23] After induction of general anesthesia, the supine patient was placed in 1-lb head halter traction.

The neck and hemipelvis, for ICBG, were prepped and draped in a usual sterile manner. For patients undergoing ICBG, a 3- to 4-cm incision was made overlying the iliac crest. Sharp dissection was carried out down to the fascia, which was incised with electrocautery. The muscles were subperiosteally stripped off the ilium, and an appropriately sized tricortical iliac graft was resected with an oscillating saw. The bone edges were smoothed, and bone wax was placed on bleeding cancellous bone. The wound was irrigated, gel foam was placed in the bony defect, and the fascia was closed with running absorbable suture. Subcutaneous tissue was closed with interrupted absorbable suture, followed by skin closure with a subcuticular running suture. For patients who elected to receive allograft, the neck procedure was performed first. A 2- to 3-cm horizontal incision was made on the left side of the neck at the appropriate level. Once sharply through the skin, blunt dissection was carried down to the spine, taking the standard anterior approach. The fascia was dissected off the spine, and an 18-gauge needle was placed in the disc space. Fluoroscopy was then used to obtain a lateral view of the cervical spine, with needle in place, to confirm the correct spinal level. Weight (25 lb) was carefully added to the head halter traction. Complete intervertebral discectomy was performed with pituitary rongeurs and curettes. The posterior longitudinal ligament was elevated or opened as necessary to remove free disc fragments. Endplates were decorticated and recessed with a curette. The disc space was measured, and the bone graft was cut to size and inserted into the prepared interspace. Care was taken to recess the bone graft posterior to the anterior border of the adjacent vertebral bodies. All traction was removed, and the neck was taken through full range of motion to evaluate the stability of the graft under direct visualization. Adjustments were made as necessary. A Hemovac drain (Zimmer Patient Care Division, Dover, Ohio) was placed deep in the wound to reduce the risk for neck hematoma at home. The platysma and the subcutaneous tissue were closed with interrupted absorbable suture, and the skin was closed with sterile strips. The patient wore a Philadelphia collar for 1 to 2 weeks after surgery.

All patients were transferred uneventfully to postanesthesia recovery. Patients remained in recovery until they were stable, taking oral fluids, and ambulatory. Before discharge, postoperative instructions were reviewed with the patient and caregiver, and written instructions were provided. When patients felt they could manage at home, they were released. Postoperative pain was controlled with oral narcotics; these included hydrocodone, codeine, and propoxyphene with acetaminophen.

Each patient received a phone call from one of our office nurses the evening of discharge and was visited by a home health care nurse 8, 16, and 24 hours after surgery. Two patients' spouses were nurses and provided postoperative care. Home health care nurses administered 3 doses of intravenous (IV) antibiotics, assessed vital signs, assessed pain control and drug tolerance, assessed neurologic status, and removed the neck drain and evaluated the wound 24 hours after surgery. Postoperative follow-up (history taking, physical and neurologic examinations, lateral cervical spine x-rays) took place at 2 weeks, at 4 to 6 weeks, and then as needed until steady state was reached.

Subjective questionnaires were mailed to all 56 patients, and phone calls were made in an attempt to contact nonresponders. In total, 43 patients responded. Because 2 of these patients underwent a second ACDF, and both patients completed a second questionnaire, 45 questionnaires were available for analysis. Questionnaires were completed 4.5 to 33 months (mean, 15.6 months) after surgery. Patients were asked about satisfaction with outpatient surgery, nurse visits, satisfaction with results, complications, short- and long-term postoperative pain, and return to work/function.

Charts and operative notes were reviewed to obtain data on diagnoses, procedure performed, ASC times, and our evaluation of surgical and follow-up results.

Results

Fifty-six consecutive patients had a total of 58 ACDFs performed by Dr. McGee. Of these ACDFs, 56 were 1-level and 2 were 2-level. In addition, 3 ACDFs involved C4-C5, 34 involved C5-C6, 18 involved C6-C7, 1 involved C7-T1, 1 involved C4-C6 (with Orion plate), and 1 involved C5-C7. Two patients underwent a second outpatient ACDF for a second herniated disc at a different level. Mean total ASC time was 4.98 hours (range, 1.83-8.77 hours). Mean operating room time was 1.49 hours (range, 0.87-2.20 hours). Mean procedure time was 0.87 hour (range, 0.37-1.68 hours, the latter time for C4-C6 with Orion plate and iliac crest autograft). All patients were discharged home on day of surgery, and no admissions were required in the postoperative period. Mean recovery room time was 2.4 hours (range, 0.8-6.52 hours).

One patient experienced transient numbness to bilateral finger tips, with no other complications noted in recovery. There were 3 emergency room visits, for vomiting/dysphagia likely not related to ACDF (postoperative day 17), for pain pills causing drowsiness (postoperative day 1), and for dysphagia/diarrhea likely not related to ACDF (postoperative day 7). These 3 patients were evaluated, treated, and released.

The only major complication was an ICBG site infection, which was initially treated with oral antibiotics and local débridement. Six months after surgery, the patient required hospital admission for débridement and then outpatient IV antibiotics for 6 weeks. The patient went on to full, pain-free recovery. Minor complications included 3 cases of transient dysphagia/throat fullness, an ICBG that split and later fused uneventfully, a mild rash (reaction to cefazolin), 4 cases of continued ICBG site pain (occasional moderate pain in 3 cases, mild pain in 1 case), and 1 case of transient finger numbness in recovery.

Forty-three (76.8%) of 56 patients (45 [77.6%] of 58 ACDFs) responded to mail or phone questionnaires between 4.5 and 33 months after surgery (mean, 15.6 months). Of the 45 satisfaction questionnaires that were completed, 34 (75.6%) indicated patients were very satisfied with outpatient ACDF; 9 (20%), satisfied; and 2 (4.4%), unsatisfied (1 of the 2 patients was "scared" by the anesthesiologist's preoperative consent talk; the other reported no relief of symptoms). Home nurse visits were reported as essential after surgery by 18 (41.9%) of the 43 patients, very helpful by another 18 patients (41.9%), and helpful by the last 7 patients (16.3%). Of the 43 patients, 39 (90.7%) were satisfied or very satisfied with the home nursing care they received; the other 4 (9.3%) were unsatisfied and reported that the nurses were unprepared and late. Postsurgical pain was reported as well controlled with medication after 24 (53.3%) of the 45 ACDFs, as mild to moderate after 17 ACDFs (37.8%), as severe even with medication after 3 ACDFs (6.7%), and as absent after 1 ACDF (2.2%).

Patients were very satisfied with the surgical outcome after 26 (57.8%) of the 45 ACDFs, satisfied after 13 ACDFs (28.9%), somewhat satisfied after 5 ACDFs (11.1%), and unsatisfied with no relief of neck/shoulder pain after 1 ACDF (2.2%). Significant post-ACDF neck, shoulder, or arm pain was reported in 21 cases (46.7%) but not in the other 24 cases (53.3%). Of the 21 cases of pain, 8 were described as occasional and mild, 9 as occasional and moderate, 3 as severe, and 1 as unrelated arm pain. Patients returned to their jobs by 3 weeks after 12 of 45 ACDFs (26.7%), by 6 weeks after 18 ACDFs (40%), by 3 months after 11 ACDFs (24.4%), and by more than 3 months after 3 ACDFs (6.7%); after 1 ACDF (2.2%), the patient did not return to work as a nurse because of difficulty in heavy lifting. Patients returned to their normal activities by 3 weeks after 9 ACDFs (20%), by 6 weeks after 19 ACDFs (42.2%), by 3 months after 11 ACDFs (24.4%), and by more than 3 months after 4 ACDFs (8.9%); after 2 ACDFs (4.4%), the patients were unable to return to all their preoperative activities (lifting, horseback riding, boating). In 35 (77.8%) of the 45 cases, patients said they would repeat ACDF on an outpatient basis; in 2 cases (4.4%), they were unsure; in 6 cases (13.3%), they said they would prefer an overnight stay; in 1 case (2.2%), the patient felt that 1-week hospitalization would be appropriate; in the final case (2.2%), the patient said there would be no repeat of an ACDF in any setting because of lack of symptom relief. In 37 (82.2%) of the 45 cases, patients indicated they would recommend outpatient ACDF to a friend (in 2 of these cases, they stipulated allograft only); in 5 cases (11.1%), they said they would recommend an overnight stay; in 1 case (2.2%), the patient indicated ACDF would not be recommended in any setting; and, in 2 cases (4.4%), patients were unsure.

Twenty-eight (77.8%) of the 36 patients who underwent ACDF with ICBG responded to the questionnaire. Twelve (42.9%) of these 28 reported severe graft site pain at some time, 13 reported moderate pain, and 3 reported mild pain. Of these 28 patients, 10 (35.7%) were pain-free by 1 month after surgery, 7 (25%) by 2 months, and 6 (21.4%) by 3 months; 1 patient (3.6%) required more than 6 months to become pain-free; 4 patients (14.3%) continued to have occasional pain at their ICBG site (3 moderate pain, 1 mild pain). Twenty-four (85.7%) of these 28 patients indicated they would repeat ICBG; the other 4 (14.3%) would refuse repeating ICBG (3 because of pain, 1 because of postoperative infection).

Discussion

Surgeons are performing many procedures on an outpatient basis for a variety of social and economic reasons. Our decision to perform outpatient ACDF was based on a review of literature and 2 years of personal experience performing 99 ACDFs as inpatient procedures between January 1991 and January 1993. For these patients, mean hospitalization stay was 2.5 days, and complications were minimal. Inpatient ACDF complications included 1 deep ICBG site infection, 1 superficial ICBG site infection, 1 case of transient dysphagia, 1 deep venous thrombosis, and 1 case of graft-site pain lasting more than 6 months (unpublished data). Of these complications, only transient dysphagia was noted before discharge from hospital. No vascular, neurologic, or tracheoesophageal complications were encountered. Patients were sent home with oral pain medications and complained of minimal pain at the surgical incision site and, when present, tolerable pain at the graft site. We felt that the safety, technical simplicity (in skilled hands), immediate spinal stability, and mild postoperative course we had experienced with our inpatient population would allow us to perform ACDF safely and effectively on an outpatient basis.

Results of the present study support the conclusion that outpatient ACDF is a safe and effective procedure. In general, our patients were satisfied/very satisfied (95.6%) with their outpatient experience. The only major complication was a late deep ICBG site infection. No morbidity was associated specifically with the outpatient approach. The complication rate was similar to that found in our previous inpatient experience. No patient in the study required postoperative hospital admission for pain control or complica-

tions. Four patients felt that home nursing was essential or helpful, but they were unsatisfied with it—citing nurses' lack of expertise or tardiness. We have provided additional training to the home nursing staff to rectify this problem.

As the data and methods presented in this study were used nearly 10 years ago, it is worth noting that Dr. McGee's practice of ACDF has since changed. We continue to perform outpatient ACDFs for patients thought to be good candidates and whose insurance plans allow the procedure to be done in the ASC. Over the past 4 years, Dr. McGee has performed 817 ACDFs, 89 (10.9%) in the ASC; 43 were 1-level ACDFs, 42 were 2-level ACDFs, and 4 were 3-level ACDFs. We have found that insurance reasons are the most significant limiting factor concerning patients' eligibility for outpatient ACDFs in the ASC.

The ACDF we perform today is similar to that of 10 years ago, with 2 major differences. In 1998, Dr. McGee switched to using allograft bone and plate fixation for every ACDF. With this transition from autograft ICBG, donor-site pain has been eliminated and overall patient satisfaction improved. With the increased initial stabilization afforded by plate fixation, we no longer place patients in braces or collars or restrict their activities after surgery.

As the main concern about outpatient ACDF is the potential for pharyngeal edema or hematoma causing respiratory difficulty, instituting all preventive measures is paramount. We use bipolar electrocautery to maintain meticulous hemostasis throughout the procedure. For persistent bleeding, several adjuncts are available to help attain hemostasis. We prefer to place FloSeal™ matrix (Baxter Healthcare Corporation, Fremont, Calif) into the wound for approximately 2 minutes and then follow with gentle irrigation. We continue to place drains, which are removed by the home health care nurse 24 hours after surgery. Most important, however, patients and visiting nurses are educated at length about the potential risks, warning signs, and need for immediate medical attention in the event a patient begins to experience respiratory difficulty.

ASCs have gained popularity among patients and physicians as a convenient and cost-effective alternative to hospitals. Present-day figures from our institutions show that the cost difference between ACDFs performed in the ASC and those performed in a hospital is significant. With the increased cost of the procedure plus the expense of an overnight hospital stay, the difference in many cases is between $4000 and $8000. ASC patients do have an additional cost (approximately $800) for 24 hours of home health care nursing and antibiotics. Even with this charge taken into account, however, the cost difference between inpatient and outpatient ACDFs is substantial.

We acknowledge the limitations of this study: its retrospective nature, lack of long-term follow-up, small patient population, and patient data from almost 10 years ago. Nevertheless, we believe that our results show that ACDFs can be performed safely and cost-effectively as outpatient procedures in select patients without increased risk. We recognize that outpatient ACDF is not for all patients. Some prefer ACDF on an inpatient basis for a variety of reasons. Outpatient ACDF is not a safe option for some patients because of unstable medical conditions, lack of an at-home caregiver, excessive distance to a hospital, and a variety of other reasons. Care should be taken when selecting patients for outpatient surgery.

Conclusions

ACDF with allograft or autograft is safe and effective when performed on an outpatient basis. We have found that this procedure is well tolerated by patients, who are generally satisfied with their experience and results. Outpatient complication rates are similar to our inpatient complication rates. No specific complications were attributed to the outpatient approach.

Authors' Disclosure Statement

The authors report no actual or potential conflict of interest in relation to this article.

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