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Chapter

Safety and Efficiency of Cervical Disc Arthroplasty in Ambulatory Surgery Centers

Richard N.W. Wohns

Abstract

Introduction Anterior cervical surgeries have been safely performed in ambulatory surgery centers since 1995 with the first cases being one level anterior cervical discectomies without fusion, then in 1996, one level anterior cervical discectomies with fusion (ACDF). When it is was certain that outpatient fusion was safe, the number of ACDF levels slowly and methodically were increased to the now standard outpatient maximum of four level ACDF. During this evolution, with the introduction of arthroplasty surgery, one level arthroplasties were considered appropriate for outpatient surgery and now two-level outpatient cervical arthroplasties are routine and some three level arthroplasties have been performed with no additional morbidity compared to one level procedures. The author first reported a series of 27 patients in 2010 who underwent cervical disc replacement at an ASC. (Wohns, R. Safety and cost-effectiveness of outpatient cervical disc arthroplasty. Surg. Neurol. Int. 1, 77, 2010). The average operative time was 40 minutes and the patients were observed over a period of three hours prior to discharge. None of the patients had major complications and there were no reports of worsening or persistent pain. The results of a Delphi study in 2018 compared the safety and efficiency of one-level and two-level arthroplasty procedures performed in an ASC and in a hospital setting. (Gornet et al. Safety and Efficiency of Cervical Disc Arthroplasty in Ambulatory Surgery Centers vs Hospital Settings. Int’l J of Spine Surgery. Vol. 12, No.5, 2018, pp. 557-564). The study analyzed outcomes of 145 ASC patients, 348 hospital outpatients and 65 hospital inpatients and the conclusion was that both one and two-level arthroplasties may be performed safely in an ASC. Surgeries in ASCs are of shorter duration and performed with less blood loss without increased AEs. At the present time, there does not appear to be any contraindication to performing the vast majority of cervical arthroplasties in an ambulatory surgery center (ASC). Furthermore, the cost of an outpatient arthroplasty is commonly 30% to 50% of the cost of hospital-based procedures.

Keywords: Outpatient, cervical disc arthroplasty, ASC, ambulatory surgery center

1. Introduction

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When it was certain that outpatient fusion was safe, the number of ACDF levels slowly and methodically increased to the now standard outpatient maximum of four level ACDF. During this evolution, with the introduction of arthroplasty surgery, one level arthroplasties were considered appropriate for outpatient surgery and now two-level outpatient cervical arthroplasties are routine and some three-level arthroplasties have been performed with no additional morbidity compared to one level procedures. The author first reported a series of 27 patients in 2010 who underwent cervical disc replacement at an ASC [2]. The average operative time was 40 minutes and the patients were observed over a period of three hours prior to discharge. None of the patients had major complications and there were no reports of worsening or persistent pain. The results of a Delphi study in 2018 compared the safety and efficiency of one-level and two-level arthroplasty procedures performed in an ASC and in a hospital setting [3]. The study analyzed outcomes of 145 ASC patients, 348 hospital outpatients and 65 hospital inpatients and the conclusion was that both one and two-level arthroplasties may be performed safely in an ASC. Surgeries in ASCs are of shorter duration and performed with less blood loss without increased AEs. At the present time, there does not appear to be any contra-indication to performing the vast majority of cervical arthroplasties in an ambulatory surgery center (ASC). Furthermore, the cost of an outpatient arthroplasty is commonly 30–50% of the cost of hospital-based procedures (Figure 1).

Indications for Cervical Arthroplasty.

The indications for arthroplasty vs. fusion are the same regardless of site of service, i.e., hospital inpatient, hospital outpatient (HOPD) vs. ASC outpatient. These indications include the following:
1. Skeletally mature patients

2. One or two contiguous levels (C3-7) for intractable radiculopathy with or without neck pain or myelopathy due to abnormality localized to the level of the disc space

3. Axial cervical pain due to discogenic etiology, proven with concordant discography

4. At least one of the following confirmed by MRI or CT/myelogram:
   a. Herniated nucleus pulposus
   b. Spondylosis with or without Modic endplate changes
   c. Visible loss of disc height compared to adjacent levels

5. Failure of at least six weeks of conservative treatment or progressive signs or symptoms despite non-operative treatment

2. Contraindications for cervical arthroplasty

The contraindications for arthroplasty vs. fusion are the same regardless of site of service, i.e., hospital inpatient, hospital outpatient (HOPD) vs. ASC outpatient, with the exception of certain medical co-morbidities which would preclude safe outpatient surgery. The medical co-morbidities that would require hospital inpatient arthroplasty include the following:

1. Anti-coagulation that cannot be safely discontinued peri-operatively, and therefore bridge anti-coagulation is required

2. Brittle diabetes

3. Significant sleep apnea requiring CPAP

4. Lack of proper post-operative home support by family or friends

5. Chronic opioid dependence with daily morphine equivalent $>$60

Otherwise, the routine contraindications for arthroplasty, regardless of site of service are the following:

1. Acute or chronic infection, systemic or at the operative site

2. Known allergy or sensitivity to the implant materials (cobalt, chromium, molybdenum, titanium, hydroxyapatite, or polyethylene)

3. Compromised vertebral bodies at the index level (e.g., ankylosing spondylitis, rheumatoid arthritis)

4. Marked cervical instability on resting lateral or flexion-extension x-rays
5. Osteoporosis or osteopenia (DEXA DMB T-score < −1.5)
6. Severe facet joint disease or degeneration

3. Post-operative care following cervical arthroplasty

The post-operative care following arthroplasty is the same regardless of site of service, i.e., hospital inpatient, hospital outpatient (HOPD) vs. ASC outpatient, with the exception of the length of stay i.e. time to discharge post-operatively. In the ASC setting, the time to discharge is three hours whereas the time to discharge in a hospital setting may be 24-48 hours. The care includes the following:

1. Ambulate the day of surgery
2. No lifting, bending (particularly extension), twisting x 4 weeks
3. Soft collar for use only in a car x 4 weeks
4. Meloxicam x 3 weeks
5. Back to work 1-2 weeks
6. Physical therapy, including:
   a. Isometric strengthening typically at 2 weeks
   b. Dynamic range of motion at 6 weeks as needed
7. Restrict overhead activity, repetitive neck movements, and heavy lifting for 6 weeks

4. Clinical benefits of arthroplasty vs. fusion

Cervical arthroplasty is designed to provide maintenance of physiologic motion and prevent or mitigate the negative sequelae of fusion as follows:

1. Up to 3.5 times less radiographic adjacent level degeneration
2. Nearly 4 times fewer re-operations
3. Up to 16.5% better disability improvement
4. Maintenance of motion up to 10 years post-operative
5. Up to 3 weeks faster return to work

5. Surgical technique

When cervical arthroplasty devices were first FDA approved and released on the market, it was presumed by this author that the procedure would be as safe or safer
than ACDF for several reasons. The majority of patients who undergo arthroplasty rather than fusion do not require use of a drill with resulting bone bleeding. The arthroplasty procedure is performed with removal of the cartilaginous endplates but not the bony endplates. The result is less bleeding and an overall faster procedure than ACDF surgery. Otherwise, the arthroplasty procedure is very similar to an ACDF. There have been numerous papers proving safety and efficiency of outpatient ACDF surgery [4, 5].

In the author's personal experience of more than 400 outpatient arthroplasties including both one- and two-level procedures, there have been no major AEs (Figure 2).

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Figure 2. Table graph showing the author's number of outpatient cervical arthroplasties from 2013 through 2020.
References


