

Case report

Single-Stage Bilateral Total Hip Arthroplasty in an Ambulatory Surgical Center: A Report of Three Cases

Andrzej Brzezinski, MD ^{a,*}, Casey Imbergamo, BS ^a, Matthew Weintraub, BS ^a,
Aneesh Patankar, BS ^a, Stephen Kayiaros, MD ^{a, b}

^a Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ, USA

^b University Orthopaedic Associates, Somerset, NJ, USA

ARTICLE INFO

Article history:

Received 22 November 2020

Received in revised form

24 January 2021

Accepted 30 January 2021

Available online xxx

Keywords:

Bilateral

Hip

Arthroplasty

Single-stage

Outpatient

Ambulatory surgical center

ABSTRACT

In recent years, there has been increased interest in transitioning total joint arthroplasty procedures from inpatient settings to ambulatory surgical centers to decrease costs and eliminate the need for hospital stays. In addition, simultaneous bilateral total hip arthroplasty (THA) has been found to be favorable in certain patient populations when compared with staged bilateral THA. In this study, we report the results of a series of three patients who underwent single-stage bilateral THA in a free-standing ambulatory surgical center with excellent short-term outcomes and no 90-day complications.

© 2021 The Authors. Published by Elsevier Inc. on behalf of The American Association of Hip and Knee Surgeons. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Total hip arthroplasty (THA) has become one of the most widely performed orthopedic procedures, with over 370,000 performed annually in the United States alone [1–4]. Advances in surgical techniques and multimodal analgesic protocols have improved patient safety and recovery allowing for reduction of hospital length of stays (LOS) and enabling same-day discharge with lower readmissions and decreased postoperative complications [5–7]. In terms of unilateral THA, ambulatory surgical centers (ASCs) have been found to achieve similar outcomes compared with hospital-based surgeries in selected populations while simultaneously being more cost-effective [5,8–14]. In addition, bilateral THA has been found to minimize repeated exposure to anesthesia, reduce cumulative procedure time, and lower overall cost with equivalent complication rates [15–18]. We report our first three patients who underwent simultaneous bilateral THA in a stand-alone ASC where unilateral total joint arthroplasty has been successfully performed since 2012. Compared with inpatient hospital care, utilization of the

ASC during the COVID-19 pandemic minimized potential exposure to the virus and reduced the overall cost for the health-care system without unnecessary delay of care.

All patients involved in the case report have given consent for publication of their medical record.

Case histories

Between May and June 2020, three patients underwent single-stage bilateral THA performed by one surgeon in a stand-alone ASC using a standardized protocol. All patients underwent preoperative evaluation and medical optimization before the procedure. Standard laboratory tests including complete blood count, metabolic panel, SARS Cov-2 assay, and electrocardiogram were performed and evaluated. A total joint coordinator, who helped with all the perioperative logistics and coordinated home care, was assigned to each patient. All patients met with a physical therapist preoperatively to review the postoperative therapy protocol. Each patient was admitted to the ASC on the day of the surgery. Spinal anesthesia (0.5% bupivacaine hydrochloride with epinephrine 1:200,000) and sedation were used. Patients received perioperative antibiotic prophylaxis with 2 g of cefazolin, one dose 30 minutes before incision and one dose before discharge. A direct anterior approach was used on a regular operating room table with both

* Corresponding author. 1 RWJ Place, MEB 422A, New Brunswick, NJ 08901, USA.
Tel.: +19083078019.

E-mail address: brzezinski.andrzej@gmail.com

legs prepped and draped. The more symptomatic hip was performed first, and then the contralateral hip was replaced while a physician's assistant closed the wound on the first hip. All patients received standard uncemented implants. Intraoperative fluoroscopy was used to confirm accuracy of the implant position. After implantation of the components, the deep tissues of each hip were infiltrated with a periarticular cocktail for postoperative anesthesia which consisted of bupivacaine 0.5% with epinephrine, depo-medrol, and cefazolin in normal saline. Perioperatively, pain was controlled with intravenous acetaminophen, morphine, fentanyl, and dexamethasone. As part of the perioperative blood management protocol, 1 g of tranexamic acid was administered before incision of each hip. Postoperative prophylaxis of deep vein thrombosis (DVT) was achieved with 4 weeks of rivaroxaban, and postoperative pain management regimen consisted of celecoxib, acetaminophen, tramadol, and oxycodone. Physical therapy was started as soon as patients recovered from anesthesia in the postanesthesia care unit. Patients were discharged home after completion of gait training and tolerating oral pain medications. On the evening of surgery, a visiting nurse completed a postoperative evaluation at the patient's home, and the following day, in-home physical therapy was started. Both the visiting nurse and physical therapist were in communication with our total joint coordinator. The patient was also contacted by a physician assistant on postoperative day 1. The first postoperative visit was scheduled 1 week after the surgery. Physical therapy was continued in an outpatient setting for 6 weeks followed by a home exercise program.

Case 1

A 66-year-old male (body mass index [BMI] 35) with a medical history significant for obstructive sleep apnea (well-controlled using continuous positive airway pressure therapy at home), prostate cancer in remission, hyperlipidemia, and hypothyroidism presented with bilateral hip pain which had become intractable over the past 6 months. Radiographs revealed severe degenerative joint disease of both hips (Fig. 1).

After failing all conservative treatment options, the patient opted for bilateral THA and was subsequently medically optimized for surgery. The patient underwent single-stage bilateral THA in an ASC using the described protocol. The procedure was completed in 116 minutes. The estimated blood loss was 200 mL. The patient was

hemodynamically stable postoperatively and recovered in the postanesthesia care unit. He underwent gait training and was able to ambulate with a rolling walker. The patient was discharged home 2 hours after completion of the procedure.

At the first postoperative visit, the patient was recovering well. He stopped using oxycodone 2 days after surgery, and his pain was well controlled with NSAIDs and acetaminophen. He was ambulating with a cane. At this point, the patient had started physical therapy on an outpatient basis. Three months postoperatively, the patient's recovery was excellent. He exhibited a normal gait. Physical therapy was discontinued at this time. Radiographs demonstrated satisfactory alignment and position of the components (Fig. 2). Four months postoperatively, he was walking three miles daily for exercise. He reported continued mild lateral left hip pain which fluctuated in severity and was controlled with over-the-counter NSAIDs as needed. The patient's postoperative Harris Hip Score (HHS) was 91, an improvement from 71 for both hips preoperatively. He was diagnosed with trochanteric bursitis of the left hip, which was treated with an injection of bupivacaine and depo-medrol with relief of symptoms.

Case 2

A 56-year-old male (BMI 33) with a medical history significant for hypertension and hyperlipidemia presented with bilateral hip pain which began 1 year before presentation. Radiographs revealed severe degenerative joint disease of both hips (Fig. 3). After failing a trial of outpatient physical therapy, activity modifications, and anti-inflammatory medications, the patient elected to undergo bilateral THA. The procedure was completed in 130 minutes without complications. The estimated blood loss for the procedure was 200 mL. The patient recovered from the surgery and was discharged home after 7 hours. Prolonged recovery was due to postoperative nausea and vomiting.

At the first postoperative visit 1 week after the surgery, the patient was recovering well. He was ambulating with a walker. Radiographs demonstrated satisfactory alignment and position of the components (Fig. 4). He began outpatient physical therapy 1 week after surgery. The patient's pain was controlled with oxycodone twice daily for the first week, and once daily for the second week. By the third postoperative week, the patient no longer required narcotics for pain control. Three months postoperatively,



Figure 1. Case 1 preoperative antero-posterior pelvis radiograph demonstrating bilateral hip osteoarthritis.

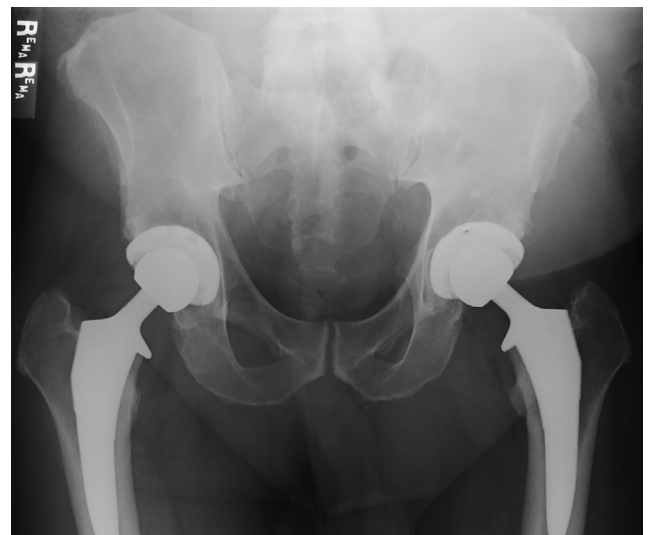


Figure 2. Case 1 postoperative antero-posterior pelvis radiograph demonstrating bilateral uncemented total hip arthroplasties.



Figure 3. Case 2 preoperative antero-posterior pelvis radiograph demonstrating bilateral hip osteoarthritis.

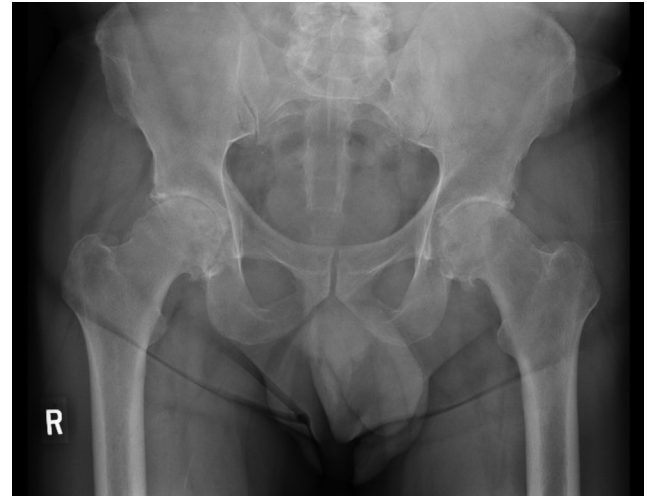


Figure 5. Case 3 preoperative antero-posterior pelvis radiograph demonstrating bilateral hip osteoarthritis.

the patient was walking with a normal gait without assistive devices. He discontinued outpatient physical therapy and continued with a home exercise program. His HHS was 100, an improvement from 45 for both hips preoperatively. No complications were reported.

Case 3

A 62-year-old male (BMI 26.6) with a medical history significant for obstructive sleep apnea presented with a 5-year history of bilateral hip pain. Radiographs showed degenerative joint disease in both hips (Fig. 5). The patient failed a trial of anti-inflammatory medications, pain medications, and physical therapy and subsequently elected to undergo bilateral THA. The procedure was completed in 103 minutes without complications. The estimated blood loss for the procedure was 150 mL. The patient recovered uneventfully and was discharged home 4 hours after surgery.

At 1 week postoperatively, the patient was recovering well, and his pain was well-controlled. He was ambulating with a cane and began outpatient physical therapy. Radiographs demonstrated



Figure 4. Case 2 postoperative antero-posterior pelvis radiograph demonstrating bilateral uncemented total hip arthroplasties.

satisfactory alignment and position of the components (Fig. 6). Over the course of the first 3 weeks postoperatively, the patient managed his pain with tramadol. Three months postoperatively, the patient's recovery was excellent. No complications were reported. He was walking with a normal gait. His HHS was 100, an improvement from 63 for both hips preoperatively.

Discussion

Single-stage bilateral THA in the inpatient setting is considered the gold standard of care for patients with end-stage bilateral hip osteoarthritis. However, there has been increasing interest in transitioning surgical procedures from inpatient settings to ASCs, for both the benefit of patients as well as the health-care system [19]. It has been found that readmission rates, number of adverse events, and LOS are minimized at ASCs [5,8–12]. Not only do ASCs provide similar outcomes but they are also significantly more cost-effective for patients. Compared with hospitals, ASCs reduce medical costs by an average of 16% for all procedures and can save patients between 17% and 43% on orthopedic surgeries [13,14].

The earliest report of THA in an outpatient setting was published in 2004, and since then, there has been a significant increase in the volume of arthroplasty procedures in outpatient settings and ASCs



Figure 6. Case 3 postoperative antero-posterior pelvis radiograph demonstrating bilateral uncemented total hip arthroplasties.

[20,21]. The incidence of total joint arthroplasty in outpatient settings is projected to continue to increase, with over half of all primary joint arthroplasties being performed in an outpatient setting by 2026 [22]. While simultaneous bilateral THA appears to be beneficial for both the patient and the health-care system, increased risks of postoperative complications have all been reported, including thromboembolic disease, blood loss, transfusion requirements, as well as decreased functional outcomes requiring increased rates of discharge to rehabilitation facilities [23,24]. A recent meta-analysis by Shao et al. [18] of 63,909 patients, however, demonstrated that simultaneous bilateral THA had fewer major complications, including death, pulmonary embolism, DVT, cardiovascular, or neurologic complications, and fewer minor systemic complications including postoperative anemia. Their study also demonstrated decreased cumulative operative time, LOS, and cost in the simultaneous THA cohort [18].

When comparing functional outcomes of unilateral THA vs simultaneous bilateral THA, no significant differences were found in postoperative function with similar HHS reported at 2-year follow-up [25–28]. While there are existing data to support the safety of THA in the setting of an ASC, and the efficacy of single-stage bilateral THA, there is a paucity of literature which has addressed both concurrently. To our knowledge, this is the first study that demonstrates the feasibility of performing single-stage bilateral THA in an ASC. The eligibility criteria for bilateral THA at our institution include age <75 years, BMI <40, and hemoglobin level >12.0 g/dL. Absolute contraindications include history of congestive heart failure, coronary artery disease, chronic obstructive pulmonary disease, renal insufficiency, and uncontrolled diabetes mellitus with an HgbA1C level >8.0% [29]. None of the patients in this study required a blood transfusion, experienced a DVT or pulmonary embolism (PE), or had any postoperative complications at 90-day follow-up. One patient required 7 hours in recovery before discharge because of significant nausea and vomiting. The other patients were discharged between two and four hours after surgery. All patients had adequate preoperative hemoglobin levels (>12.0 g/dL), and tranexamic acid was used intraoperatively. We did not routinely check postoperative labs. Our study presents a protocol for single-stage bilateral THA in a stand-alone ASC that can be successfully implemented with excellent outcomes.

Conclusion

This is the first case report to describe the feasibility, safety, and efficacy of performing simultaneous bilateral THA in a free-standing ASC. There were no complications and excellent outcomes at 90-day follow-up.

Conflict of interests

Dr. Kayiaros is a paid consultant for Corin, received research support from Depuy Synthes, and owns Pfizer stock. Other authors have no financial interest or personal relationships that can influence the work reported in the article.

References

- [1] Sloan M, Premkumar A, Sheth NP. Projected volume of primary total joint arthroplasty in the U.S., 2014 to 2030. *J Bone Joint Surg Am* 2018;100:1455.
- [2] Maradit Kremers H, Larson DR, Crowson CS, et al. Prevalence of total hip and knee replacement in the United States. *J Bone Joint Surg Am* 2015;97:1386.

- [3] Varacallo M, Chakravarty R, Denehy K, Star A. Joint perception and patient perceived satisfaction after total hip and knee arthroplasty in the American population. *J Orthop* 2018;15:495.
- [4] Varacallo MA, Herzog L, Toossi N, Johanson NA. Ten-year trends and independent risk factors for unplanned readmission following elective total joint arthroplasty at a large urban academic hospital. *J Arthroplasty* 2017;32:1739.
- [5] Parcels BW, Giacobbe D, Macknet D, et al. Total joint arthroplasty in a stand-alone ambulatory surgical center: short-term outcomes. *Orthopedics* 2016;39:223.
- [6] Nelson SJ, Webb ML, Lukaszewicz AM, Varthi AG, Samuel AM, Grauer JN. Is outpatient total hip arthroplasty safe? *J Arthroplasty* 2017;32:1439.
- [7] Berger RA, Sanders SA, Thill ES, Sporer SM, Della Valle C. Newer anesthesia and rehabilitation protocols enable outpatient hip replacement in selected patients. *Clin Orthop Relat Res* 2009;467:1424.
- [8] Berend ME, Lackey WG, Carter JL. Outpatient-focused joint arthroplasty is the future: the Midwest center for joint replacement experience. *J Arthroplasty* 2018;33:1647.
- [9] Husted C, Gromov K, Hansen HK, Troelsen A, Kristensen BB, Husted H. Outpatient total hip or knee arthroplasty in ambulatory surgery center versus arthroplasty ward: a randomized controlled trial. *Acta Orthop* 2020;91:42.
- [10] Klein GR, Posner JM, Levine HB, Hartzband MA. Same day total hip arthroplasty performed at an ambulatory surgical center: 90-day complication rate on 549 patients. *J Arthroplasty* 2017;32:1103.
- [11] Toy PC, Fournier MN, Throckmorton TW, Mihalko WM. Low rates of adverse events following ambulatory outpatient total hip arthroplasty at a free-standing surgery center. *J Arthroplasty* 2018;33:46.
- [12] Shah RR, Cipparrone NE, Gordon AC, Raab DJ, Bresch JR, Shah NA. Is it safe? Outpatient total joint arthroplasty with discharge to home at a freestanding ambulatory surgical center. *Arthroplast Today* 2018;4:484.
- [13] United States. Government accountability Office. Medicare: payment for ambulatory surgical centers should be based on the hospital outpatient payment system. United States: Government Accountability Office; 2006. <https://digital.library.unt.edu/ark:/67531/metadc295489/>. [Accessed 1 November 2020].
- [14] Fabricant PD, Seeley MA, Rozell JC, et al. Cost savings from utilization of an ambulatory surgery center for orthopaedic day surgery. *J Am Acad Orthop Surg* 2016;24:865.
- [15] Alfaro-Adrián J, Bayona F, Rech JA, Murray DW. One- or two-stage bilateral total hip replacement. *J Arthroplasty* 1999;14:439.
- [16] Seol JH, Park KS, Yoon TR. Postoperative complications and cost-effectiveness of simultaneous and staged bilateral total hip arthroplasty using a modified minimally invasive two-incision technique. *Hip Pelvis* 2015;27:77.
- [17] Parvizi J, Rasouli MR, Jaberi M, et al. Does the surgical approach in one stage bilateral total hip arthroplasty affect blood loss? *Int Orthop* 2013;37:2357.
- [18] Shao H, Chen CL, Maltenfort MG, Restrepo C, Rothman RH, Chen AF. Bilateral total hip arthroplasty: 1-stage or 2-stage? A meta-analysis. *J Arthroplasty* 2017;32:689.
- [19] Gogineni HC, Gray CF, Prieto HA, Deen JT, Boezaart AP, Parvataneni HK. Transition to outpatient total hip and knee arthroplasty: experience at an academic tertiary care center. *Arthroplast Today* 2018;5:100.
- [20] Berger RA, Jacobs JJ, Meneghini RM, Della Valle C, Pappas W, Rosenberg AG. Rapid rehabilitation and recovery with minimally invasive total hip arthroplasty. *Clin Orthop Relat Res* 2004;239.
- [21] Arshi A, Leong NL, Wang C, Buser Z, Wang JC, SooHoo NF. Outpatient total hip arthroplasty in the United States: a population-based comparative analysis of complication rates. *J Am Acad Orthop Surg* 2019;27(2):61.
- [22] DeCook CA. Outpatient joint arthroplasty: transitioning to the ambulatory surgery center. *J Arthroplasty* 2019;34(7S):S48.
- [23] Berend KR, Lombardi AVJ, Adams JB. Simultaneous vs staged cementless bilateral total hip arthroplasty: perioperative risk comparison. *J Arthroplasty* 2007;22:111.
- [24] Ritter MA, Randolph JC. Bilateral total hip arthroplasty: a simultaneous procedure. *Acta Orthop Scand* 1976;47:203.
- [25] Taheriazam A, Mohseni G, Esmailiejah AA, Safdari F, Abrishamkarzadeh H. Bilateral total hip arthroplasty: one-stage versus two-stage procedure. *Hip Int* 2019;29:141.
- [26] Guo SJ, Shao HY, Huang Y, Yang DJ, Zheng HL, Zhou YX. Retrospective cohort study comparing complications, readmission, transfusion, and length of stay of patients undergoing simultaneous and staged bilateral total hip arthroplasty. *Orthop Surg* 2020;12:233.
- [27] Houdek MT, Wyles CC, Watts CD, et al. Single-anesthetic versus staged bilateral total hip arthroplasty: a matched cohort study. *J Bone Joint Surg Am* 2017;99:48.
- [28] Parcels BW, Macknet DM, Kayiaros ST. The direct anterior approach for 1-stage bilateral total hip arthroplasty: early outcome analysis of a single-surgeon case series. *J Arthroplasty* 2016;31:434.
- [29] Lanting BA, Odum SM, Cope RP, Patterson AH, Masonis JL. Incidence of perioperative events in single setting bilateral direct anterior approach total hip arthroplasty. *J Arthroplasty* 2015;30(3):465.