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The Direct Anterior Approach for 1-Stage Bilateral Total Hip Arthroplasty: Early Outcome Analysis of a Single-Surgeon Case Series

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A B S T R A C T

Background: One-stage bilateral total hip arthroplasty (B-THA) is rarely performed despite a 20% incidence of bilateral degenerative hip disease requiring surgical intervention.
Methods: We retrospectively evaluated functional outcomes in 22 consecutive patients undergoing B-THA with a matched cohort undergoing unilateral THA by the same surgeon using the direct anterior approach.
Results: Although there was a significant difference in blood loss ($P < .01$) and surgical time ($P < .001$), there was no difference in length of hospital stay ($P = .09$), number of discharges to a rehabilitation facility ($P = .22$), or postoperative Harris Hip scores ($P = .75$).
Conclusions: Advances in blood loss and pain management protocols in association with the direct anterior approach should renew interest in the efficacy of 1-stage B-THA.

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Total hip arthroplasty (THA) has become 1 of the most successful orthopedic operations today for patients with chronic hip pain secondary to degenerative joint disease. It has been estimated that 15% to 25% of patients being considered for THA ultimately require bilateral procedures [1,2]. In patients with bilateral hip disease, optimal function is not entirely regained until both hips have been replaced [3].

The ideal timing of surgery in patients requiring bilateral THA remains a subject of discussion. The potential advantages of a 1-stage B-THA vs a 2-stage procedure include a shorter hospital stay [4,5], single anesthetic, lower hospital cost, and a potential earlier return to functionality. Critics of the simultaneous procedure have cited increased risks of venous thromboembolic events (VTEs), heterotopic ossification, higher blood transfusion requirements, and increased need for secondary rehabilitation facilities [2,6-11].

The surgical procedure for THA has undergone an evolution because it was initially introduced. A variety of surgical approaches to the hip have been described, most of which are performed through a posterolateral, direct lateral, or direct anterior approach (DAA). The DAA is advantageous in bilateral THA (B-THA) due to the inherent positioning difficulties and surgical site compromise in the lateral technique as well as avoidance of postoperative hip precautions. It has also been suggested that the DAA for THA reduces pain levels and improves early return of function [12-16].

There is little literature reviewing the use of DAA in B-THA. Two articles have described low and acceptable complication rates [17,18]; however, they do not include a comparison group, they do not evaluate functional outcome measures, and they do not use contemporary blood and pain management protocols. The purpose of this study was to retrospectively compare functional outcomes in patients undergoing B-THA vs unilateral THA (U-THA) using the DAA performed by a single surgeon.

Materials and Methods

After institutional review board approval, a retrospective review of inpatient medical records and preoperative and postoperative outpatient clinical charts was undertaken. Beginning in 2013, 22 consecutive patients who underwent 1-stage B-THA over a 20-month period were matched to 22 consecutive U-THA performed in the same period. Overall, the senior surgeon performed more than 200 elective primary THAs, using DAA in 95.1% of cases, and 10.1% were B-THA. Patients were considered candidates for DAA B-THA if they had degenerative joint disease of the hips that was clinically and radiographically symmetric and if the surgeon felt that patient would benefit from a simultaneous THA

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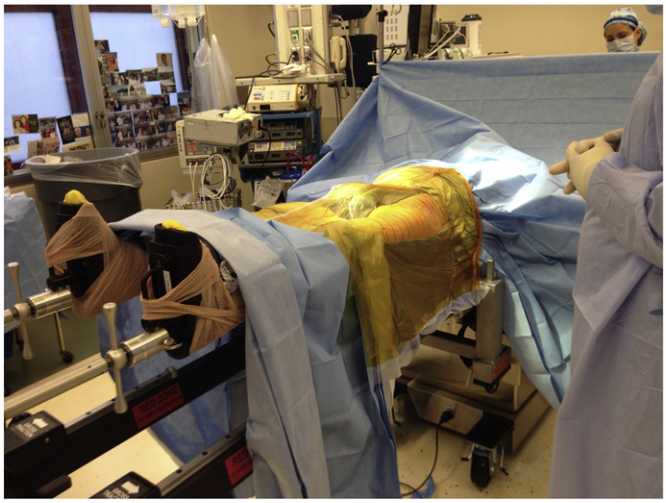

Fig. 1. Surgical positioning for 1-stage bilateral THA.

procedure given their pain and disability. Exclusion criteria for B-THA included older than 80 years, history of stroke, VTE, congestive heart failure, pulmonary hypertension, end-stage renal disease, or preoperative anemia.

The senior surgeon performed surgery on all patients using a uniform surgical technique and postoperative protocol. All surgeries were performed via the DAA using a Hana Table (Mizuho OSI) for positioning (Fig. 1). All patients received a standard titanium acetabular shell (Pinnacle; Depuy, Warsaw, IN); a highly cross-linked polyethylene liner (AltrX; Depuy); a press-fit, hydroxyapatite-coated, titanium femoral stem (Corail; Depuy); and a ceramic femoral head (Biolox; Ceramtec AG, Lauf, Germany). For B-THA, the first procedure was performed on the more symptomatic side, and after completion and closure of the wound, THA was performed on the contralateral hip.

Blood management protocols were the same for all patients, which consisted of giving 1 g of tranexamic acid (TXA) before incision and 1 g at closure, unless contraindicated. For patients undergoing B-THA, 1 g of TXA was administered before incision on each hip. No patient donated autologous blood or was given preoperative erythropoietin. Intraoperative red blood cell salvage was not used. A standard fluid management protocol was followed for all patients during and after surgery. Intravenous fluids were continued at a rate of 75 to 100 mL/h for 24 hours postoperatively and then variably discontinued depending on the level of oral intake.

A multimodal pain management protocol, both during and after surgery, was administered to all patients. A multimodal periarticular injection consisting of bupivacaine liposomal injectable suspension (Exparel; Pacira, La Jolla, CA), epinephrine, morphine, depomedrol, and cefazolin in 20-mL normal saline was given after implantation of components. Perioperatively, patients received 3 doses of intravenous acetaminophen (Ofirmev; Mallinckrodt, St. Louis, MO) and 2 doses of intravenous dexamethasone. The periarticular and intravenous steroid were held in patients with diabetes, which affected 2 B-THA patients and no U-THA patients. The postoperative pain protocol consisted of celecoxib, oxycodone hydrochloride extended-release (for 7 days only), and oxycodone for breakthrough pain. In addition, patients received 1 dose each of celecoxib, oxycodone hydrochloride extended-release, and gabapentin preoperatively the morning of surgery.

Patients were allowed to bear full weight immediately after surgery and were hospitalized for medical management, perioperative antibiotics for 24 hours, pain control, and physical therapy. Patients undergoing B-THA were started on 10 mg daily of rivaroxaban for a total of 30 days postoperatively as venous thromboembolism prophylaxis, whereas patients having U-THA were started on 325 mg of enteric-coated aspirin twice daily for 30 days.

The demographic information collected included age, sex, body mass index (BMI) (kilograms per square meter), reason for undergoing hip arthroplasty, comorbidities, preoperative Harris Hip Score (HHS), and the preoperative America Society of Anesthesia (ASA) physical classification system.

Postoperatively, patients were seen in the office at 3 weeks, 3 months, and then once a year after their surgery. All patients in this cohort were followed up for a minimum of 6 months, and the average follow-up time of the current study was 12.9 months. Primary outcome measures included length of hospital stay, discharge to home vs rehabilitation facility, need for a walking aid at 3 weeks postoperatively, and HHS at 3-month follow-up. Thromboembolic events and other complications in the 90-day postoperative period were recorded. In addition, blood loss during surgery, surgical time, and intraoperative complications were noted. The number of inhospital transfusions was collected. The decision to transfuse was based on threshold hemoglobin less than 7.0 g/dL or hypovolemic signs and symptoms unresponsive to fluid resuscitation.

Data for the B-THA and the U-THA group were analyzed using R software (R-project.org) for statistical analysis. Demographic and outcome measures were compared between the 2 groups using *t* tests for continuous outcome measures and χ^2 test for the binary outcome measures. In addition, multiple logistic linear regression analysis was performed to examine outcome differences between groups by controlling for other covariates, which represented the conditions of the surgery and patient demographics. Power analysis of outcome measures showed that, with the sample size of 22 for each of the 2 groups, there should be a 90% power to yield a statistically significant result, assuming a 2-sided error rate of 5%.

Results

The demographics for each cohort are listed in Table 1. The mean age for bilateral THA was 59 years old as compared with 65 years old for the unilateral ($P = .06$), which approached statistical significance but was not significant. Differences in other demographics, including BMI ($P = .27$), ASA ($P = .13$), preoperative HHS ($P = .16$), and sex ($P = 1.0$), were not significant, despite power analysis demonstrating an 86.4% power to detect a 0.5-point difference in ASA between groups. All patients carried a diagnosis of osteoarthritis, except for 1 B-THA patient with degenerative hip disease secondary to osteonecrosis.

The operative time was significantly longer for bilateral THA (mean, 180 vs 101 minutes; $P < .001$). In addition, intraoperative blood loss was significantly higher in the bilateral THA group (mean, 473 vs 201 mL; $P < .01$). The transfusion rate was higher in the bilateral group ($P = .04$). In the B-THA group, 5 (23%) of 22 patients received a transfusion, with an average of 1.4 units per patient. In the unilateral THA group, 1 (5%) of 22 patients received a transfusion, which was a single unit.

There was no difference in intraoperative complications, with 1 event occurring in each group. There was a calcar fracture in 1 of the bilateral patients treated with cerclage cable and allowed to weight bear immediately. In the unilateral THA group, 1 patient required return to operating room for removal of foreign body related to broken instrumentation that was identified on the postoperative x-ray. There were

Table 1
Patient Demographics.

	Bilateral Group	Unilateral Group	
	n = 22	n = 22	*P*
Sex			
Male/female	19/13	18/14	1.0
Age	58.6	65.2	.06
BMI	27.1	28.5	.27
ASA	2.0	2.3	.12
Preoperative HHS	44.7	48.9	.16