Simultaneous Bilateral Anterior Approach Total Hip Arthroplasty

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abstract

Simultaneous bilateral total hip arthroplasty (THA) has been performed successfully, with good outcomes and low complication rates reported. Most published studies on the topic used anterolateral or posterior surgical approaches. The anterior approach is performed under live fluoroscopy with the patient supine, obviating the need for patient repositioning during bilateral surgery. The authors report their experience with simultaneous bilateral anterior approach total hip arthroplasty. The authors retrospectively reviewed data for 75 patients (150 hips). Mean follow-up was 26 months (range, 5-60 months). Mean patient age was 59 years and the majority were American Society of Anesthesiology class 2 (range, 1-3). Mean total surgical time was 144 minutes (72 minutes per hip). Mean blood loss was 565 mL. Mean hospital length of stay was 2.75 days (range, 1-4 days). Ninety-six percent of patients were able to ambulate on postoperative day 1. Sixty-eight percent of patients were discharged to home. Mean Harris Hip Score improved from 50 to 97. All patients noted a return to preoperative level of activity or higher. Complications included 1 atraumatic minimally displaced trochanteric fracture occurring 2 weeks postoperatively, 1 pulmonary embolism on postoperative day 3 treated without sequelae, 1 episode of postoperative atrial fibrillation, and 4 minor local wound complications. No readmission, infection, nerve palsy, dislocation, reoperation, or death occurred. Anterior approach THA has the advantage of a single supine position for bilateral simultaneous surgery and the current study supports its use in appropriate patients. [Orthopedics. 2015; 38(7):e611-e615.]
Currently, surgeons are performing an estimated 300,000 total hip arthroplasties (THA) each year in the United States. Several etiologies can cause bilateral disabling hip pain requiring THA. Primary osteoarthritis, the most common indication for THA, occurs bilaterally in 42% of patients. Single-stage bilateral THA was first reported by Charnley in 1967. Simultaneous bilateral THA and staged bilateral THA during the same hospital admission have regularly been investigated and reported on since that time. Simultaneous bilateral THA has several advantages. Proponents cite a decrease in cost and hospitalization time, the use of a single anesthetic, and improved hip flexion and values for activities of daily living (ADL). Despite these potential advantages, the safety of bilateral THA during the same hospitalization remains controversial. A recent study found that bilateral THA increases the risk of systemic complications compared with unilateral surgery.

The purpose of the current study is to evaluate and report the short-term postoperative outcomes of simultaneous bilateral anterior approach THA (AATHA). The authors’ hypothesis was that simultaneous bilateral AATHA is safe and effective, with low complication rates and good clinical outcomes.

**Materials and Methods**

The study is an institutional review board-approved, retrospective review of patient data for 75 consecutive patients (150 hips) who underwent simultaneous bilateral AATHA between July 2007 and December 2012. All procedures were performed by 1 of the 2 senior authors (S.B., R.S.G.) at a single institution. Both surgeons are fellowship trained in arthroplasty with significant experience in AATHA.

All patients who underwent bilateral THA during the study period were included. Indications for bilateral THA included patients with symptomatic end-stage hip arthritis with an American Society of Anesthesiology (ASA) class between 1 and 3. Relative contraindications included advanced physiologic age (generally age older than 75 years) and obesity (based on surgeon’s comfort with AATHA anatomically). All patients were “cleared” by an internal medicine specialist prior to surgery with routine preoperative laboratory data evaluated, including complete blood count, chemistry panel, and urinalysis.

The surgical team consisted of 1 surgical technician, 1 physician’s assistant, and 1 surgeon (S.B. or R.S.G.). A single-incision anterior approach to each hip was performed from the supine position in a similar way to that popularized by Matta et al. A specialized orthopedic fracture table (hana; Mizuho OSI, Union City, California) was used. A spinal anesthetic was used in all cases. Two units of autologous blood were routinely pre-donated for the majority of the earlier cases. The pre-donation practice changed so that limited, selective pre-donation blood was used for the remainder of patients. Tranexamic acid was used at 1000 mg intravenously prior to incision for only the last 6 patients.

A single-instrument setup was used, and 1 preoperative prep and draping was performed, encompassing both hips. Preoperative antibiotics were universally used. Total hip arthroplasty was typically performed on the more symptomatic side first. Contralateral THA was started during closure of the initial hip. Subcutaneous and cutaneous closure was routinely performed by the physician’s assistant while the surgical technician assisted the surgeon with the start of the contralateral procedure. Intraoperative fluoroscopy was used to ensure appropriate positioning of components and restoration of leg length and offset. Uncemented primary components were used in all cases.

Postoperative care for all patients was similar. Routine perioperative prophylactic antibiotics were administered. A reservoir suction drain placed intraoperatively was removed within 24 hours postoperatively. All patients were allowed full weight bearing as tolerated immediately postoperatively. Assistive devices for ambulation were discontinued when the patients felt comfortable doing so, as guided by physical therapy. Hospital discharge was dictated by achieving physical therapy goals and adequate pain control. Postoperative venous thromboembolic prophylaxis consisted of enoxaparin 40 mg subcutaneously for 2 weeks, with the first dose occurring the first postoperative morning, followed by oral aspirin (325 mg orally daily) for 4 weeks.

Data collected from perioperative records included age, gender, race, body mass index (BMI), diagnosis, preoperative pain and functional status using the Harris Hip Score (HHS), and ASA physical status classification. Intraoperative variables examined included operative time, estimated blood loss, thromboembolic event, procedure-related fracture, and neurovascular injury. Postoperative variables examined included postoperative blood loss from drains, rate of transfusion, ambulation distance by postoperative day, hospital length of stay, discharge disposition (home or rehabilitation or skilled nursing facility), venous thromboembolic event, infection, hematoma, wound complication, nerve palsy, aseptic loosening, dislocation, periprosthetic fracture, hospital readmission, postoperative pain, and functional status (measured by HHS), reoperation, and death. Pain during the first 3 postoperative days was rated for all patients using the verbal numerical scale, with 0 representing no pain, 1 to 3 as mild pain, 4 to 7 as moderate
pain, and 8 or more as severe pain, with 10 being the worst pain of their life.

Postoperatively, all patients were evaluated at 6 weeks, 3 months, 1 year, and annually thereafter. At each visit, documentation included postoperative pain and functional status (measured by HHS), any complications, and postoperative radiographs.

RESULTS

From July 2007 through December 2012, seventy-five simultaneous bilateral AATHA procedures were performed, representing 150 hips. Forty-four (58.7%) of 75 patients were men and 31 were women (41.3%). Mean age was 59 years (range, 40-78 years; SD, 8.4 years). Mean body mass index was 26.5 kg/m² (range, 18.6-37 kg/m²; SD, 3.8 kg/m²). The majority (n=58 [77.3%]) of patients had an ASA class of 2. Ten (13.3%) were ASA class 1; 7 (9.3%) were ASA class 3. Mean total operative time was 144 minutes (range, 101-211 minutes; SD, 22.4 minutes), for a mean of 72 minutes per operative hip.

Mean intraoperative estimated blood loss was 562 mL (range, 100-1500 mL; SD, 219.9 mL). Mean postoperative blood loss from drains was 571 mL (range, 0-1450 mL; SD, 319.8 mL). Mean hemoglobin and hematocrit on the morning of postoperative day 1 were 9.8 g/dL (range, 7.1-12.3 g/dL; SD, 1 g/dL) and 29.1% (range, 21.9%-36.8%; SD, 2.9%), respectively.

Sixty-two (82.7%) of 75 patients received a postoperative blood transfusion. Thirty-one (50%) of these 62 patients received a return of their pre-donated autologous blood only. The remaining 50% received either allogenic transfusion only or a combination of autologous and allogenic blood. Thus, the transfusion rate of any allogenic blood was 31 (41.3%) of 75 patients. The overall mean transfusion amount was 2.09 units (range, 0-6 units; SD, 1.4 units). Thirteen (17.3%) patients did not require a blood transfusion. In the current series of 75 patients, the authors observed a decrease in units transfused per patient, with the first 25 patients averaging 2.6 units per patient and patients 51 through 75 averaging 1.6 units per patient.

No intraoperative complications occurred, including no procedure-related fractures, thromboembolic events, or nerve or vascular injuries.

On the morning of postoperative day 1, 37 (49.3%) patients reported no pain, 28 (37.3%) reported mild pain, 10 (13.3%) reported moderate pain, and 0 (0%) reported severe pain. Seventy-two (96%) patients ambulated with a front-wheel walker on postoperative day 1, with a mean distance of 204.8 ft (range, 5-2150 ft; SD, 307.3 ft). The remaining 3 (4%) patients ambulated on postoperative day 2.

Mean length of hospital stay was 2.75 days (range, 1-4 days; SD, 0.68 days). One (1.3%) patient was discharged on postoperative day 1. Twenty-six (34.7%) patients were discharged on postoperative day 2. Thirty-nine (52%) patients were discharged on postoperative day 3. Nine (12%) patients were discharged on postoperative day 4. Fifty-one (68%) patients were discharged home. Twenty-four (32%) patients were discharged to an acute rehabilitation or skilled nursing facility.

One patient was lost to follow-up postoperatively; thus, the total number of patients available for clinic follow-up was 74 (98.7%). Mean follow-up for those 74 patients was 26 months (range, 5-59.6 months). Minimum 1-year follow-up data were available for 86.7% of patients. All 74 (100%) patients, on subjective questioning, reported a return to preoperative level of activity or higher at their last follow-up visit. Nineteen (25.7%) of 74 reported performing at an activity level higher than their preoperative state. This corresponded with an increase in HHS function scores for the group from pre- (11.7) to postoperative (43.1) (P<.01). Composite HHS increased from 49.8 preoperatively to 97.8 postoperatively (P<.01).

No readmissions within 30 days occurred postoperatively. At the time of final follow-up, no infection, motor nerve palsy, symptomatic sensory nerve palsy, fracture, aseptic loosening, dislocation, reoperation, or death had occurred.

Complications included 1 atraumatic minimally displaced trochanteric fracture occurring 2 weeks postoperatively, 1 pulmonary embolism on postoperative day 3 treated without sequelae, 1 episode of postoperative atrial fibrillation, and 4 minor local wound complications that resolved with local wound care.

DISCUSSION

The concept of performing a single-stage or staged bilateral THA is not new. Since its original description by Charnley in 1967, it has been regularly investigated and reported.2-3 The purported advantages include decreased overall length of stay, decreased overall recovery time, use of a single anesthetic, decreased cost, and improved motion and ADL values.4-26 Despite these advantages, there remains concern about the safety of bilateral simultaneous or staged THA.

In a multivariate analysis showing that bilateral THA had higher risk of systemic complications (odds ratio [OR], 2.1; P<.001) compared with the unilateral procedure, Rasouli et al27 found an increased rate of local complications in staged vs simultaneous bilateral THA (OR, 1.75; P=.05). They concluded that bilateral THA increases the risk of systemic complications compared with unilateral surgery, but that simultaneous bilateral THA appears to be safer than staging during 1 hospitalization. The operative approach used was not defined in this study.27

The anterior approach is uniquely suited for bilateral simultaneous THA. It has the advantage of a single supine patient position for prep and draping, obviating the need for intraoperative repositioning. In addition, supine positioning permits the use of intraoperative fluoroscopy for real-time evaluation of component positioning, leg length, and offset. Although a wealth of literature, noted above, has investigated bilateral simultaneous or staged THA, only
2 studies were identified that specifically analyze the procedure performed via the anterior approach.

The largest series of simultaneous bilateral AATHA was reported by Mast et al, in which 147 procedures were performed. Their study had nearly equal numbers of men and women (71 vs 76) with a mean age of 62 years (range, 19-84 years) and a mean BMI of 27 kg/m² (range, 15.47 kg/m²). Mean length of follow-up was 4.82 years (range, 6 months to 12.5 years). Mean operative time was 1.14 hours per hip (range, 0.66-2.33 hours). Mean blood loss was 578 mL. Four direct surgical complications were noted in their series: 1 femoral nerve palsy with full motor recovery by 1 year, 1 dislocation managed with closed reduction, 1 calcar crack managed with observation, and 1 calcar crack that went on to periprosthetic fracture. No deep infections or recurrent dislocations were noted. Mean inpatient hospitalization was 4 days (range, 2-14 days). A majority (73%) of patients were discharged home. One hundred twenty-four patients were followed for longer than 1 year. No failures or revisions were noted in any patient. Functional results as judged by Merle d’Aubigne scores were good or excellent in all cases, averaging 17.46 at 1 year (range, 16-18; max score, 18). They concluded that simultaneous bilateral AATHA had good short-term clinical and functional results with acceptable complication rates.

Weinstein et al also demonstrated favorable results with simultaneous bilateral AATHA in a population of 43 patients 75 years or older. Their results were compared with those of 136 patients younger than 75 years who underwent the same procedure. They used hybrid or cemented components. They noted that patients 75 years or older were more likely to experience minor postoperative morbidity, such as ileus or urinary tract infections. At a mean follow-up of 2.5 years, 90% of the patients lived independently, 80% walked without assistive devices, and 90% were pain free. They concluded that single-stage bilateral AATHA is a safe and effective option even for patients 75 years or older when pain and functional limitations affect quality of life.

In the current study, the authors reported 75 patients (150 hips) who underwent simultaneous bilateral AATHA using primary uncemented components. Comparison of the current data with that of Mast et al verifies the reproducibility of the approach for simultaneous bilateral THA (Table). Although selection criteria were dissimilar between the 2 studies, available data show similar demographics with respect to age and BMI. The mean age of 59 years in the current study is comparable to Mast et al (62 years), and BMI in both studies averaged 27 kg/m². Available perioperative data show the current results are comparable with Mast et al and are similar with respect to mean total operative time (2.4 vs 2.28 hours), intraoperative estimated blood loss (562 vs 578 mL), mean length of stay (2.75 vs 4 days), and percentage discharged to home (68% vs 73%).

Intraoperative blood loss and postoperative transfusion rates can be expected to be high after bilateral simultaneous AATHA. Available data from the 2 noted studies on AATHA corroborate the current findings. Both Weinstein et al and Mast et al reported the use of an intraoperative “cell-saver” red blood cell salvage device. Weinstein et al reported 514 mL re-transfused via cell-saver, with a mean of 0.98 units of allogenic blood transfused intraoperatively. They noted a total transfusion rate of 70% (30 of 43 patients). Mast et al noted a return of cell-saver blood when possible but the amount was not quantified. They reported a total mean blood loss of 578 mL. They noted that all patients who had pre-donated blood (26%) received it postoperatively and that an additional 12% of patients required transfusion. These 12% of patients averaged 1.64 units of allogenic blood transfused.

In the current study, mean operative blood loss (562 mL) and transfusion volume (2.09 units) per patient were similar. Mean transfusion decreased from 2.6 units in the first 25 patients to 1.6 units in the last 25 patients. The authors believe that the reason for this change was multifactorial. Their practice of pre-donation with routine postoperative administration of autologous blood was abandoned during the study period. The authors also saw a decrease in intraoperative estimated blood loss over the series, which was attributed to surgical advances in the AATHA “learning curve.” The transfusion thresholds became more strict over time as well, with the adoption of a well-defined hospital transfusion protocol. During the last cases in the series, the current authors began using 1000 mg of tranexamic acid.

### Table

Comparison of Data Between Studies Evaluating Simultaneous Bilateral Anterior Approach Total Hip Arthroplasty

<table>
<thead>
<tr>
<th>Factor</th>
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<th>Current Study</th>
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<td>Procedures, No.</td>
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<td>Age, mean, y</td>
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<tr>
<td>Discharged to home, %</td>
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<td>68</td>
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Abbreviations: BMI, body mass index; EBL, estimated blood loss.
IV preoperatively. These data are underpowered to determine the significance of this single intervention, but TXA has recently shown utility in decreasing blood loss in bilateral total knee arthroplasty.\(^\text{31}\)

The compilation of data on blood loss and transfusion rates for bilateral simultaneous AATHA highlights the significance of the issue and should make the surgical team aware of the importance of appropriate patient selection, preoperative treatment of anemia as needed, and perioperative use of blood conservation measures.

**CONCLUSION**

The current review of consecutive bilateral AATHA procedures found low rates of perioperative complication and excellent clinical outcomes. The procedure was efficient, with a mean total operative time of 144 minutes (72 minutes per hip) and a mean length of stay of 2.8 days, without readmission. These data add to that of Mast et al.,\(^\text{29}\) supporting simultaneous bilateral THA via the anterior approach in appropriately selected patients at an institution capable of performing the procedure efficiently. Future prospective studies may more clearly define the relative risk of bilateral THA performed via the anterior approach vs alternative surgical approaches.

**REFERENCES**


