



Greater Prevalence of Wound Complications Requiring Reoperation With Direct Anterior Approach Total Hip Arthroplasty



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ABSTRACT

The purpose of this retrospective study was to compare wound complication rates between primary THAs performed via a posterior or direct anterior approach. From our prospective outcomes registry, we identified 1288 primary THAs performed via a posterior approach and 505 via a direct anterior approach. The direct anterior approach resulted in a significantly greater number of wound complications that required reoperation than the posterior approach (7/505 (1.4%) vs. 3/1,288 (0.2%), $P = 0.007$). As such, patients should be counseled on the potential increased risk of early wound complications with the direct anterior approach, and future research is needed to determine if alternative closure techniques can reduce the risk of wound complication.

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Over the past decade, the number of primary total hip arthroplasties (THA) performed annually in the United States has continued to increase, with 332,000 THAs performed in 2010 [1]. During this time, orthopaedic surgeons and patients alike have demonstrated an increasing interest in the direct anterior approach. Proponents of the direct anterior approach cite a more rapid postoperative recovery and reduced risk of dislocation as potential benefits of the approach [2], and as many as 20% of arthroplasty specialists have begun using the approach [3].

Despite the recent surge in utilization of this technique that is relatively new to the United States, few comparisons of acute complications to other surgical approaches are available in the literature. Specifically, the direct anterior approach has been reported to result in a high number of wound complications, with 1.6% requiring reoperation [4]. The purpose of this retrospective study was to compare wound complication rates between primary THAs performed via a posterior or direct anterior approach. We hypothesized that there would be significantly greater prevalence of wound complications requiring reoperation with the direct anterior approach than the posterior approach.

Methods

We retrospectively reviewed surgical records and clinical data collected as part of our IRB-approved outcomes registry. From the registry, we identified 1288 THAs performed via a posterior approach

(PA) and 505 THAs performed via a direct anterior approach (DAA). All patients that had either PA or DAA THA were included, with none being excluded on the basis of age, gender, BMI, preoperative diagnosis, or any comorbidities. All procedures were performed by a single board-certified, fellowship-trained orthopaedic surgeon between September, 2003 and January, 2014, with the DAA beginning to be used in March, 2010. Patients were selected to have DAA if they had no bony deformity or osteoporosis and a BMI < 40 with no overhanging abdominal pannus. Patient demographics are presented in Table 1.

PA THA was performed with the patient positioned in the lateral decubitus position. The patient was prepped and draped using DuraPrep (3M, St. Paul, MN) and Steri-Drape with Ioban (3M, St. Paul, MN). A posterolateral incision was utilized and the fascia was divided in line with the skin incision. The short external rotators and capsule were tagged in separate layers, and the femoris quadratus was preserved. At the conclusion of each case, the fascia was closed with interrupted and running PDS sutures. The skin was closed with an interrupted subcutaneous 2-0 vicryl and with a running 3-0 monocril stitch. The incision was covered with steri-strips, Xeroform (Covidien, Mansfield, MA), and 4" × 4" gauze and tape. A Hemovac drain was used, and was removed on postoperative day 1 with the dressing removed on postoperative day 2.

DAA THA was performed with the patient supine on a fracture table. An anterior incision was made from 3 cm lateral to the anterior superior iliac spine distally to the vastus ridge. No soft tissue undermining was performed. The fascia was divided in line with skin incision and the tensor fascia musculature was retracted laterally. No wound towels or skin protecting devices were used. The rectus femoris was retracted medially, and the anterior circumflex vessels were identified, tied off, and divided, and the anterior capsule was

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Table 1
Patient Demographics for THAs Performed With Either a Posterior or Direct Anterior Approach, Demonstrating a Difference in Patient Selection Criteria With Direct Anterior THAs Being Used More Often in Younger Males With Lower BMIs.

	Posterior THA	Direct Anterior THA	P
N	1,288	505	–
Gender (Male/Female)	510/778 (60.4% Female)	^a 251/254 (50.3% Female)	< 0.001
Age	64.7 ± 12.7	^a 63.5 ± 9.9	0.03
BMI	30.7 ± 8.0	^a 27.6 ± 9.1	< 0.001
Diagnosis			
Osteoarthritis	1,048 (81.4%)	466 (92.3%)	0.34
Avascular Necrosis	73 (5.7%)	^a 16 (3.2%)	0.04
Osteonecrosis	5 (0.4%)	^a 9 (1.8%)	0.01
Inflammatory Arthritis	13 (1.0%)	3 (0.6%)	0.58
Post-traumatic Arthritis	44 (3.4%)	^a 2 (0.4%)	< 0.001
Hip Dysplasia	23 (1.8%)	7 (1.4%)	0.68
Displaced Femoral Neck Fracture	66 (5.1%)	^a 1 (0.2%)	< 0.001
Femoral Neck Non-Union	8 (0.6%)	0 (0%)	0.12
Other	8 (0.6%)	1 (0.2%)	0.46

^a Significantly different from posterior THA patients.

excised. At the conclusion of the case, fascia and subcutaneous closures were performed in the same manner as the PA THAs. However, the skin was closed with two coats of Dermabond (Ethicon, Inc., Somerville, NJ) and covered with Tegaderm (3 M, St. Paul, MN). The closure and dressing were chosen in order to prevent skin breakdown from friction due to the anterior abdominal pannus upon the recommendations of other orthopaedic surgeons with a great deal of experience with DAA THA. A Hemovac drain was used, and was removed on postoperative day 1 with the dressing left on 10 uninterrupted days.

Thromboprophylaxis was similar between the groups. All low-risk PA THAs were treated with 325 mg aspirin, and low-risk DAAs were treated with either 325 mg aspirin or 1 mg warfarin. High-risk THAs were treated with adjusted-dose warfarin regardless of approach. Postoperative rehabilitation was similar between groups, but PA THAs were given standard posterior hip precautions whereas DAA THAs were not.

Statistical Analysis

We recorded the number of THAs that required reoperation for wound-related complications for the groups of PA and DAA THAs. Wound complications were defined as either infected or non-infected superficial hematomas, persistent wound drainage, or acute prosthetic joint infections. Patient demographics were compared using independent t-tests, and a Fisher Exact Test was used to compare the prevalence of wound complications that required reoperation between groups. An α -level of $P < 0.05$ was considered statistically significant, and SPSS Statistics v22 (IBM, Armonk, NJ) was used for all analyses.

Results

There were a significantly greater number of DAA THAs that required reoperation as a result of wound-related complications (7/505 (1.4%) vs. 3/1288 (0.2%), $P = 0.007$). While the overall rate of wound complication that required reoperation was significantly greater for the DAA THAs, there did not appear to be one particular type of wound complication that occurred more often in that group (Table 2). Of the seven DAA THAs that required reoperation, two were due to non-infected hematomas, two due to infected hematomas, two for delayed wound healing or eschar, and one for prosthetic joint infection. The patient treated for prosthetic joint infection underwent single stage revision 20 days after the primary THA procedure. The other six patients underwent irrigation and debridement without further complication. Of the PA THAs, two underwent irrigation and debridement; one for a non-infected hematoma and one for an infected

hematoma. The other underwent irrigation and debridement for an acute prosthetic joint infection, but later underwent two-stage revision for a chronically infected joint.

Discussion

The purpose of this retrospective study was to compare wound complication rates between primary THAs performed via a posterior or direct anterior approach. The results of the current study supported our hypothesis that there would be significantly greater prevalence of wound complications requiring reoperation with the direct anterior approach than the posterior approach. The current result of 1.4% of DAA THAs with wound complications was consistent with other published complication rates. Jewett et al reported that 13/800 (1.6%) of DAA THAs had wound complications that required reoperation [4]. Kennon et al reported that 38/2132 (1.8%) anterior THAs had either a hematoma or acute infection [5].

On the contrary, Namba et al concluded that surgical approach was not related to deep surgical site infections [6]. In their large series, 3/494 DAA THAs (0.6%) had a deep surgical site infection, which were very similar to the 0.5% rate demonstrated in their group of PA THAs (112/23,694 THAs) [6]. However, Namba et al solely evaluated surgical site infections, whereas the current study included hematomas as well. If we were to only include infections in the current analysis, we too saw a 0.6% rate of surgical site infections with the DAA approach (3/505 THAs). While it remains debatable whether the rate of surgical site infections may not differ between the PA and DAA, there were clearly more wound complications that required reoperation with the DAA approach.

Some have suggested that the number of early complications with the DAA may be a result of the learning curve associated with a new technique [5]. In a series of 200 THAs, Hallert et al reported that this was not the case as there did not appear to be any difference in complications after a surgeon had completed 10 DAA THAs [7].

Table 2
Reasons for Reoperation Between THAs Performed With Either a Posterior or Direct Anterior Approach.

	Posterior THA	Direct Anterior THA	P
N	1,288	505	–
Total Number of Reoperations	2 (0.2%)	^a 7 (1.4%)	<0.001
Reason for Reoperation			
PJI or infected hematoma	1	3	0.07
Non-infected hematoma	1	2	0.19
Delayed wound healing	0	2	0.08

^a Significantly different from posterior THA patients.

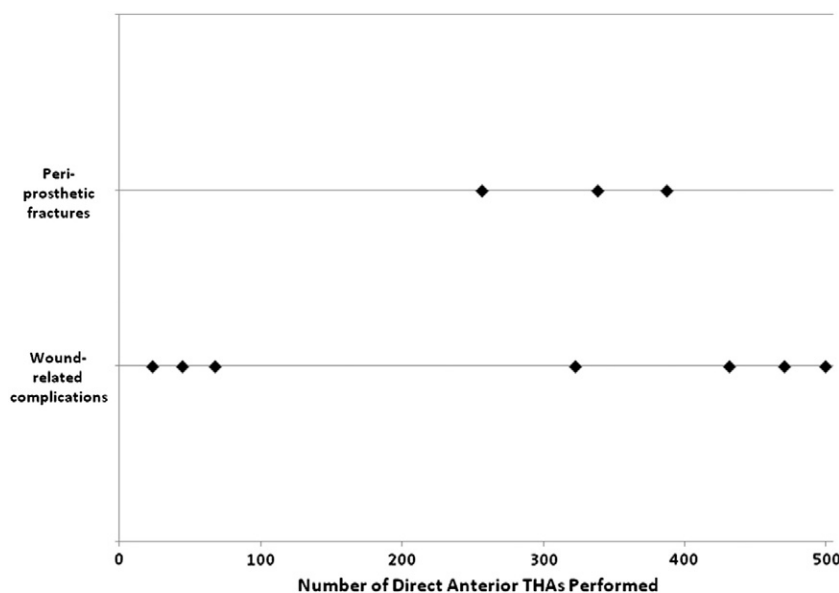


Fig. 1. A timeline demonstrating the occurrence of early complications with the direct anterior approach in chronological case order.

Similarly, there did not appear to be a learning curve effect in our current series. Three of the wound complications occurred in the first 100 cases performed, but three occurred after the 400th case. Furthermore, we have previously reported three DAA THAs that suffered Vancouver Type B peri-prosthetic fractures during the first 30 days after surgery [8]. When including these other early complications, there does not appear to be a learning curve effect (Fig. 1).

This study was not without limitation. Our ability to state that the increased wound complication rate was solely related to the surgical approach may be somewhat limited. First, we recorded only the number of wound complications that required reoperation. As such, we cannot state whether there was a difference in the number of wound complications that could be treated conservatively between the two approaches. There was also a clear difference in patient selection, as the DAA was used more commonly in younger male patients with lower BMI. In terms of infection risk, the greater percentage of male patients in the DAA group may have been related to somewhat higher infection rate as male gender has been associated with an increased risk of PJI [2,6]. However, it has also been recently reported that female gender, when combined with other comorbidities, was associated with an increased risk of infection [9]. The lower age and BMI of the DAA group may not be related to increased risk of infection, as Malinzak et al reported that neither age nor BMI was related to the risk of PJI after primary THA [10]. Finally, there were differences in how the skin was closed between the two groups. Topical dressing selection has been demonstrated to be related to the rate of postoperative infection in TKA, and future studies will need to determine if the rate of wound complications with DAA THA can be reduced with the use of alternative closure techniques such as an Aquacel dressing [11]. Other methods have also been suggested to potentially reduce wound complications, including the use of a betadine rinse, an Alexis wound retractor (Advanced Medical Resources Corp., Rancho Santa Margarita, CA), and/or a maternity sling for an overhanging abdomen, although each of these will need to be thoroughly evaluated to determine if wound complications can be reduced for patients undergoing DAA THA.

In conclusion, improved function during the first 6 weeks to 6 months with DAA THA when compared to PA THA seems to be fairly consistent in the literature [12,13], but this finding has not been unanimous [9]. A more rapid recovery is important to patients, and in the current medical-economic environment, earlier function allowing

earlier hospital discharge is important to hospital administrators and other stake holders as well. But, we must exercise caution when adopting surgical techniques without fully appreciating the potential risks and technique pitfalls that may be involved with either increased risk of early complications, especially in the absence of published long-term results. We are not suggesting that the direct anterior approach be abandoned as there does appear to be a place for direct anterior THA. However, we do recommend surgeons use discretion in terms of patient selection for this approach, and that patients be counseled on the potential increased risk of early complication with the direct anterior approach.

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