The Journal of Arthroplasty 31 (2016) S162–S165

Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org

Complications - Infection

Severely Obese Patients Have a Higher Risk of Infection After Direct Anterior Approach Total Hip Arthroplasty

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ARTICLE INFO

Article history:
Received 1 December 2015
Received in revised form
11 March 2016
Accepted 17 March 2016
Available online 26 March 2016

Keywords:
obesity
primary hip arthroplasty
anterior approach
infection
wound complications

ABSTRACT

Background: The orthopedic literature documents that obesity can place patients at increased risk for complications. This is the first study to document the increased risk of infection in obese patients after direct anterior approach (DAA) primary total hip arthroplasty (THA).
Methods: We retrospectively evaluated 1621 consecutive primary THAs performed with a DAA. Patients were stratified by body mass index <35 kg/m^2 (group 1) or ≥35 kg/m^2 (group 2). Rates of postoperative infection requiring revision, superficial wound dehiscence, return to the operating room, and total wound complications were compared. There were 1417 cases in group 1 and 204 in group 2.
Results: Five cases in each group had a deep infection, resulting in a significantly higher rate in group 2 (0.35% vs 2.5%, $P = .0044$, relative risk = 7.1). Superficial wound dehiscence was diagnosed in 13 (0.92%) THA in group 1 and 4 (1.96%) in group 2 ($P = .256$). The all-cause reoperation rate was 0.92% and 3.43% in each group, respectively ($P = .008$). The total rate of all studied complications was 1.27% compared to 4.41% ($P = .0040$, relative risk = 3.5).
Conclusion: This is the first study to report on significantly increased rates of postoperative infection requiring revision in patients with body mass index ≥35 kg/m^2 after anterior approach hip arthroplasty. We believe it is the combination of immune dysfunction and proximity of the anterior incision to the inguinal crease and genitalia with overlying abdominal pannus that contributes to this risk. Further studies comparing other surgical approaches in obese patients are needed to determine if this complication is truly attributable to the DAA alone.

It is well-known that obesity increases the perioperative risks after total joint arthroplasty [1-4]. With the combination of increasing demand for total hip arthroplasty (THA) and obesity epidemic that plagues our country, complications associated with increased body mass index (BMI) will continue to rise [5]. Few studies have reported on the incidence of postoperative wound and infectious complications with the direct anterior approach (DAA) to THA [6-8]. Those that have reported, cite the relatively thin anterior skin, overlying pannus, and adjacent genitalia as potential contributors to increased risk of infection [6-8]. The present study is the largest cohort of DAA THA patients reporting on the incidence of postoperative infection and wound complications relative to patient BMI.

The purpose of this study was 2-fold: determine the rates of postoperative infection and wound complications after primary THA via a DAA, and second, stratify patients based on BMI to determine if obesity affects these outcomes. We hypothesized that patients with BMI ≥35 kg/m^2 would have significantly higher rates of wound complications and postoperative infection requiring revision.

Materials and Methods

This study is a single-center, single-surgeon, retrospective cohort analysis. We queried our institution's total joint arthroplasty

One or more of the authors of this paper have disclosed potential or pertinent conflicts of interest, which may include receipt of payment, either direct or indirect, institutional support, or association with an entity in the biomedical field which may be perceived to have potential conflict of interest with this work. For full disclosure statements refer to http://dx.doi.org/10.1016/j.arth.2016.03.037.

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http://dx.doi.org/10.1016/j.arth.2016.03.037
0883-5403/

database to identify all primary THAs performed between 2009 and 2014 and identified 1621 cases that were available for analysis. Reasons for THA included osteoarthritis or avascular necrosis. There was a minimum of 1-year follow-up, unless a patient developed wound complications or required a return trip to the operating room before the 1-year time point. All cases were performed via the DAA with a well-described technique [9]. The procedures were performed on a fracture table with the use of a hydraulic hook to aid in femoral exposure. All patients received perioperative antibiotics before skin incision and for 24 hours postoperatively.

Patients were separated into 2 study groups based on BMI: <35 kg/m^2 (group 1) and ≥35 kg/m^2 (group 2). BMI was calculated using the standard formula of weight in kilograms divided by the square of the height in meters. The World Health Organization classifies people with a BMI ≥35 as severely obese. The primary outcome measure was postoperative infection requiring return to the operating room for a revision procedure. Periprosthetic infections were defined by recommendations according to the American Academy of Orthopaedic Surgeons [10]. Revision consisted of either debridement with head-and-liner exchange or 2-stage revision, as dictated by the clinical scenario. The incidence of superficial wound dehiscence was defined as any wound separation that required additional treatment beyond the standard wound care or return to the operating room for wound revision. Only deep infection was included in the current analysis of revision THA. Data analysis did not include complications requiring return to the operating room for complications of dislocation, periprosthetic fracture, component malposition, pain, or aseptic loosening. All outcome measures were analyzed via a Fisher's exact test, with significance set at .05.

Results

Demographics

Overall, 1621 total hip cases met the inclusion criteria for the study, having a primary THA via an anterior approach by a single surgeon. There were 1417 cases in group 1 (BMI <35), comprising 614 (43.3%) men and 803 (56.7%) women. The average patient age at the time of surgery was 63.3 years, and the average BMI was 26.7 kg/m^2. There were 204 cases in group 2 (BMI ≥ 35), which included 81 (39.7%) men and 123 (60.3%) women. Their average age was 59.3 years (P < .001), and the average BMI was 39.3 kg/m^2 (Table 1).

Postoperative Periprosthetic Joint Infection

The overall incidence of deep infection that required a revision in the entire study group, regardless of BMI, was 10 of 1621 cases (0.62%). Overall, 204 of 1621 arthroplasties (12.6%) were performed in patients with a BMI ≥35 kg/m^2. Among these severely obese patients, 5 cases (2.5%) had a deep infection treated with a revision procedure, compared to 5 of the 1417 patients (0.35%) with a BMI <35 kg/m^2, P = .0044. Therefore, the relative risk (RR) of infection of group 2 compared to group 1 was 7.1. Table 2 lists the type of revision procedure and the responsible bacteria, where known, for each case.

Table 1
Basic Demographic Data.

	Group 1, BMI <35 kg/m^2 (SD)	Group 2, BMI ≥35 kg/m^2 (SD)	*P* Value
N	1417	204	
Average age, y	63.3 (±11.0)	59.3 (±10.26)	<.001
Average BMI	26.7 (±3.855)	39.3 (±4.018)	<.001
Males	614	81	.36
Females	803	123	.36

BMI, body mass index; SD, standard deviation.

Table 2
Revisions for Infection, N = 10.

Case #	BMI	Group	Bacteria	Procedure
239	27.6	1	*Streptococcus* group C	Head and liner exchange
1490	25.9	1		Head and liner exchange
1518	19.0	1		2-Stage revision
1137	22.9	1	*Streptococcus agalactiae*	Head and liner exchange
1320	31.6	1		Head and liner exchange
215	40.8	2	*Citrobacter koseri*	2-Stage revision
1301	38.8	2	*Enterobacter cloacae*	Head and liner exchange
493	48.1	2	*Proteus mirabilis*	I&D and 2-stage revision
672	41.4	2	*Staphylococcus aureus*	Head and liner exchange
896	48.6	2	*Staphylococcus intermedius*	Irrigation & debridement[a]

[a] Because of anticoagulant and body habitus, full revision was contraindicated in case #896.

Superficial Wound Dehiscence

In addition to the patients that were revised for infection, 13 patients (0.92%) in group 1 and 4 (1.96%) in group 2 developed superficial wound dehiscence and healing problems that required additional treatment (P = .256), such as that shown in Figure 1. Eight patients (0.56%) in group 1 required a return trip to the operating room for wound irrigation and debridement and closure compared to 2 patients in group 2 (0.99%, P = .364). For all of these patients, the fascia was found to be intact and only superficial irrigation and debridement with revision wound closure was performed. For patients with a wound dehiscence complication that did not necessitate operative intervention, treatment consisted of daily dressing changes with close-interval follow-up, topical trypsin ointment, and/or a short course of oral antibiotics according to the senior author's discretion and appearance of the wound.

Total Complications

The total rate of all studied complications, including infections, for the entire cohort was 27 of 1621 arthroplasties (1.66%). When stratified by BMI, the overall rate for all postoperative complications studied was 1.27% for group 1 and 4.41% for group 2 (P = .0040, RR = 3.5). The reoperation rate was 0.92% and 3.43%, respectively (P = .008, RR = 3.7; Table 3).

Discussion

The purpose of the present study was to determine rates of deep infection requiring revision and wound dehiscence after a DAA THA by a single surgeon. Patients were stratified according to BMI (<35 kg/m^2 or ≥35 kg/m^2) to determine if severe obesity was a risk factor for development of these types of complications.

The overall complication rate, regardless of BMI was 1.66%, which is comparable to recently reported rates in DAA hips [7,8]. Watts et al reported on wound complications in obese patients after both the DAA and posterior approaches. Although the present study does not compare these 2 approaches, our statistically significant rates of total complications and all-cause reoperations in patients with BMI ≥35 kg/m^2 are similar to the findings by Watts et al [7].

Although a few recent studies have reported on total wound complication rates after the DAA, they do not address deep infection rates requiring a revision arthroplasty with respect to patient BMI [7,8]. To our knowledge, this is the first available study to report on differences in deep infection rates after DAA with regard