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## Comparatively increased complications in obese patients undergoing total hip arthroplasty through a direct anterior approach

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### Abstract

**Background:** Direct Anterior IP replacement is a minimally invasive surgical technique. This approach involves a 3 to 4 inch incision on the front of the hip that allows the joint to be replaced by moving muscles aside along their natural tissue planes, without detaching any tendons. This approach often results in quicker recovery, less pain, and more normal function after hip replacement. The Direct Anterior (DA) approach for Total Hip Arthroplasty (THA) has demonstrated successful short term outcomes in several studies. However, there is no consensus about which patients are appropriate candidates for DA Total Hip Arthroplasty. It is also unclear if short term outcomes in obese patients undergoing THA through a DA approach are elevated in comparison to non-obese patients.

**Objective:** The aim of this study was to evaluate complication rates and short term outcomes of obese, pre-obese, and normal Body Mass Index (BMI) patients undergoing Total Hip Arthroplasty with a Direct Anterior approach in a consecutive group of patients.

**Design:** A retrospective study of 200 consecutive patients who underwent unilateral THA through a DA approach for osteoarthritis or avascular necrosis during the early peri-operative period.

**Duration:** November 2016 to December 2017.

**Setting:** Department of Orthopaedics, Bhaskar Medical College, Hyderabad.

**Participants:** 200 consecutive patients who underwent unilateral THA through a DA approach.

**Methods:** All adult patients undergoing primary total hip arthroplasty were eligible for inclusion. A retrospective chart review of 210 consecutive patients who underwent unilateral primary THA through a DA approach was conducted. All 200 cases used the same implants. The direct anterior approach utilized a modified Smith–Peterson interval. A standard operating table was used along with a femoral elevator. Routine use of fluoroscopy was not used. Unless contraindicated, patients were treated with a standardized pain protocol. A local tissue pain injection was administered as well as intravenous tranexamic acid. The same closure technique was utilized for all patients. Physical therapy followed a standardized protocol and began on postoperative day 0. Standard post-discharge follow-up was at two and six weeks. All patients were placed on aspirin 325 mg twice daily for DVT prophylaxis. Electronic and paper medical records were reviewed to determine surgical time, length of stay, discharge disposition, major and minor complications, and short-term outcome measures. Major and minor complications were separately described.

**Results:** The obese group demonstrated increased surgical times, as well as increased length of stay, narcotic use, and assistive device use at two weeks. In addition, major complications and wound complications were both significantly increased in the obese group. There was also a trend toward increased use of rehabilitation facilities in the obese group at disposition.

**Conclusion:** Obese patients undergoing a DA approach have many times increase in major and wound complications compared to patients with a BMI <30. Obese patients also demonstrated significant increases in operative time, use of narcotics, use of assistive devices, and length of stay.

**Keywords:** total hip arthroplasty, direct anterior approach, obese, BMI

### Introduction

Total hip arthroplasty is an orthopedic procedure that involves the surgical excision of the head and proximal neck of the femur and removal of the acetabular cartilage and subchondral bone. An artificial canal is created in the proximal medullary region of the femur, and a metal femoral prosthesis, composed of a stem and small-diameter head, is inserted into the femoral medullary canal. An acetabular component composed of a high-molecular-weight polyethylene

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articulating surface is inserted proximally into the enlarged acetabular space. To yield successful results, these total hip arthroplasty components must be fixed firmly to the bone, either with polymethylmethacrylate cement or, in more recent uncemented designs, by bony ingrowth into a porous coating on the implant, resulting in "biologic" fixation. Total hip arthroplasty (THA) has become one of the most reliable and patient-requested surgical interventions in all medicine. The procedure can be performed using a variety of surgical approaches, but the posterior approach, direct lateral approach, and direct anterior approach are by far the most common across the globe. Direct anterior hip replacement is a minimally invasive surgical technique. This approach involves a 3 to 4 inch incision on the front of the hip that allows the joint to be replaced by moving muscles aside along their natural tissue planes, without detaching any tendons. This approach often results in quicker recovery, less pain, and more normal function after hip replacement. Because the tendons aren't detached from the hip during direct anterior hip replacement, hip precautions are typically not necessary. This allows patients to return to normal daily activities shortly after surgery with a reduced risk of dislocation. The Direct Anterior (DA) approach for Total Hip Arthroplasty (THA) has demonstrated successful short term outcomes in several studies. However, there is no consensus about which patients are appropriate candidates for DA Total Hip Arthroplasty. It is also unclear if short term outcomes in obese patients undergoing THA through a DA approach are elevated in comparison to non-obese patients. The aim of this study was to evaluate complication rates and short term outcomes of obese, pre-obese, and normal Body Mass Index (BMI) patients undergoing Total Hip Arthroplasty with a Direct Anterior approach in a consecutive group of patients.

### Materials and Methods

This is a retrospective study of 200 consecutive patients who underwent unilateral THA through a DA approach for osteoarthritis or avascular necrosis during the early peri-operative period. All adult patients undergoing primary total hip arthroplasty were eligible for inclusion. A retrospective chart review of 210 consecutive patients who underwent unilateral primary THA through a DA approach was conducted. All 200 cases used the same implants. The direct anterior approach utilized a modified Smith-Peterson interval. A standard operating table was used along with a femoral elevator. Routine use of fluoroscopy was not used. Unless contraindicated, patients were treated with a standardized pain protocol. A local tissue pain injection was administered as well as intravenous tranexamic acid. The same closure technique was utilized for all patients, Derma bond was applied topically and an occlusive foam dressing was applied.

Physical therapy followed a standardized protocol and began on postoperative day 0. Standard post-discharge follow-up was at two and six weeks. All patients were placed on aspirin 325 mg twice daily for DVT prophylaxis. Electronic and paper medical records were reviewed to determine surgical time, length of stay, discharge disposition, major and minor complications, and short-term outcome measures. Major and minor complications were separately described.

### Observations and Results

#### Patient Characteristics by Bmi and Age

**Table 1:** Patient Characteristics by BMI and Age

BMI Group	Mean	Standard Deviation
<b>Normal(n=25)</b>		
BMI	21.34	1.334
Age	59.98	11.006
<b>Pre-Obese(n=75)</b>		
BMI	26.98	1.241
Age	66.12	11.112
<b>Obese Class I(n=50)</b>		
BMI	30.98	1.670
Age	58.67	10.665
<b>Obese Class II(35)</b>		
BMI	38.76	1.714
Age	56.13	8.998
<b>Obese Class III(15)</b>		
BMI	43.99	3.665
Age	52.90	14.997

Two hundred consecutive patients, undergoing total hip arthroplasty through a direct anterior approach by a single experienced surgeon, were evaluated (Table 1). Comparing normal and pre-obese patients (BMI<30) to a combined group of WHO class I, II, and III obese patients, wound complication rates were 4.0% in the BMI >30 group, and 9% in the combined group.

#### Odds Ratio Estimates: Normal and Pre-Obese (Combined) Vs Obese

**Table 2:** Odds Ratio Estimates: Normal and Pre-Obese (Combined) vs Obese

	Odds Ratio	P Value
Minor Complications	3.788	0.0419
Major Complications	8.431	0.0488

The odds ratio showed a 7.6 fold increase for major complications and a 2.8 fold increase for minor complications in the obese group when compared to the normal and pre-obese group combined.

#### Comparison of Normal and Pre-Obese (Combined) Vs Obese

**Table 3:** Comparison of Normal and Pre-Obese (Combined) vs Obese

Characteristics	Normal and Pre-Obese(N=100)	Obese(N=100)
<b>Minor Complications</b>		
Yes	6(6%)	12(12%)
No	94(94%)	88(88%)
<b>Major Complications</b>		
Yes	2(2%)	7(7%)
No	98(98%)	93(93%)
ASA Score	2.3±0.4	2.6±0.5
Pain-Pre	6.7±1.9	7.8±2.2
Pain-2 Weeks	2.2±2.0	2.6±2.4
Pain-6 Weeks	1.5±2.2	2.0±2.3
<b>Narcotics(2 Weeks)</b>		

Yes	31(31%)	42(42%)
No	69(69%)	58(58%)
Narcotics(6 Weeks)		
Yes	2(2%)	8(8%)
No	98(98%)	92(92%)
Assistive Device(2 Weeks)		
Yes	79(79%)	84(84%)
No	21(21%)	16(16%)
Assistive Device(6 Weeks)		
Yes	16(16%)	34(34%)
No	84(84%)	66(66%)
Length Of Stay	2.4±1.1	2.7±1.0
Discharge Disposition		
Home	91(91%)	81(81%)
Rehabilitation	9(9%)	19(19%)

There were a total of nine major complications (Table 3). Seven major complications occurred in the obese group, with three requiring a return to the operating room. Three patients required a two-stage revision procedure for infection, one required stem revision for aseptic loosening, and one with intra-operative medial femoral perforation and greater trochanteric fracture. Two patients in the obese group were diagnosed with a pulmonary embolism and treated with anticoagulation. The two major complications in the pre-obese group required a return to the operating room for infection.

### Discussion

The direct anterior approach utilizing a muscle-sparing technique has gained popularity in recent years for primary THA due its potential for improved post-operative pain, recovery and strengthening. Few studies, however, have been performed analyzing if these benefits remain significant in the obese population. Obese patients present a significant challenge for THA surgeons due to their large body habitus. We have noted that in many obese patients there is a relatively small amount of subcutaneous adipose tissue along the anterior aspect of the proximal thigh where the incision and dissection is located for the DA approach which can actually allow for a relatively routine operative procedure. Even in large patients it is often possible to mobilize and reposition the abdominal pannus away from the incision and operative field allowing for an easier exposure. Despite the many potential benefits of the direct anterior approach, there remains a real concern regarding total complication rates and the learning curve associated with its use in routine practice. Despite the many potential benefits of the direct anterior approach, there remains a real concern regarding total complication rates and the learning curve associated with its use in routine practice. This study reveals a significant increase in complication rates for obese patients in comparison to non-obese patients using the DA approach. In a prospective matched cohort study using an anterolateral approach Chee *et al.* reported a 9% major complication rate and a 13% minor wound complication rate for their obese patients which had an average BMI of 37.9. In comparison, our complication rates were 6.3% for major, and 10% for minor wound complications. Michalka *et al.* found a 14% major complication rate and a 12.3% minor complication rate in their study of obese patients undergoing THA using a posterior approach. A study by Dowsey and Choong of obese patients using a posterior approach reported a 4.4% acute infection rate in comparison to our rate of 2.5%. Overall our experience demonstrates an increased complication rate for the DA approach in obese patients that is comparable to the

published data for other operative approaches, which does not appear to be directly attributable to the DA approach itself. Limitations of this study include a retrospective design and relatively short-term follow-up with no specific outcomes instruments; however, the focus of the study was designed to analyze early complications in a specific obese population rather than long-term functional outcomes. In addition, pre-operative ASA scores were also found to be higher among the obese group indicating higher comorbidities which may contribute to wound healing problems, length of stay, and use of rehabilitation facilities. This study only provides data as to whether wound complications may be an independent risk factor for the DA approach by comparing our complication rates to the published complication rates for other approaches available in the literature. This study demonstrates that the complication rate for obese patients undergoing THA utilizing a DA approach is significantly increased in comparison to normal and pre-obese patients.

### Conclusions

Obese patients undergoing a DA approach have many times increase in major and wound complications compared to patients with a BMI <30. Obese patients also demonstrated significant increases in operative time, use of narcotics, use of assistive devices, and length of stay.

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