

# Super-Obese Patients are Associated with Significant Infection Burden after Total Hip Arthroplasty

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**INTRODUCTION:** Over one-third of the United States population is obese (body mass index (BMI) > 30 kg/m<sup>2</sup>), with an increasing proportion being morbidly obese (BMI > 40 kg/m<sup>2</sup>). As the obesity rate continues to climb, an expanding portion of our population has entered the super-obese category (BMI > 50 kg/m<sup>2</sup>), theoretically increasing their risk for complications after procedures such as total hip arthroplasty (THA). This study aimed to compare complications in non-obese, obese, morbidly obese, and super-obese patients undergoing THA. We specifically assessed: 1) one and two-year periprosthetic joint infection (PJI) rates; 2) complication rates; as well as 3) one and two-year revision rates.

**METHODS:** A review of an administrative claims database was used to identify patients undergoing primary THA from January 1, 2010 to December 31, 2019. Patients were stratified based on the presence of International Classification of Diseases, Ninth and Tenth diagnosis codes of non-obese (BMI < 30 kg/m<sup>2</sup>) (n = 8,680), obese (30 < BMI < 40 kg/m<sup>2</sup>) (n = 12,443), morbidly obese (40 < BMI < 50 kg/m<sup>2</sup>) (n = 5,250), and super-obese (BMI > 50 kg/m<sup>2</sup>) (n = 814) prior to THA. Patients must have the documented BMI within two years of surgery. All groups consisted of mutually exclusive patients. Complication rates at 90 days, one year, and two years were compared between groups using unadjusted odds ratios (ORs) with 95% confidence intervals (CIs).

**RESULTS:** At all timepoints, super-obese patients were associated with higher rates of PJI, even when compared to morbidly obese patients (OR: 1.56, 95% CI 1.12 - 2.18). Complications such as sepsis (OR: 1.69, 95% CI 1.01 - 2.84), venous thromboembolism (OR: 2.78, 95% CI 1.71 - 4.51), and revision surgeries (OR: 1.57, 95% CI 1.07 - 2.29) were found at higher odds in super-obese as well as morbidly obese patients, compared to obese and non-obese patients.

**DISCUSSION AND CONCLUSION:** This study provides large-scale analyses demonstrating the association between super-obese and morbidly obese patients to higher infections as well as complications following THA. Importantly, the association of PJI is highest among super-obese patients, even when compared to morbidly obese patients. Attaining a BMI < 40 kg/m<sup>2</sup> prior to surgery may be an important goal discussed with patients to lower the chance of postoperative infections.

**Table 1. Demographics**

	Super Obese (BMI > 50) (n = 814)	Morbidly Obese (BMI 40 to 49) (n = 5,250)	Obese (BMI 30 to 40) (n = 12,443)	Non-obese (BMI < 30) (n = 8,680)
Age in years, mean ± SD	62.8 ± 10	62.4 ± 10	62.9 ± 10	62.4 ± 10
Female	674 (82.8)	674 (12.7)	584 (4.7)	674 (7.8)
Female	394 (48.3)	394 (7.5)	374 (3.0)	394 (4.5)
Comorbidities				
Congestive Heart Failure	114 (14.0)	204 (3.9)	174 (1.4)	114 (1.3)
Diabetes	674 (82.8)	674 (12.7)	584 (4.7)	674 (7.8)
COPD	48 (5.9)	474 (9.1)	484 (3.9)	48 (0.6)
Hypertension	674 (82.8)	674 (12.7)	584 (4.7)	674 (7.8)
Depression	114 (14.0)	204 (3.9)	174 (1.4)	114 (1.3)
Chronic Kidney Disease	274 (33.7)	274 (5.2)	274 (2.2)	274 (3.2)
Obstructive Sleep Apnea	274 (33.7)	274 (5.2)	274 (2.2)	274 (3.2)

BMI: Body Mass Index, SD: Standard Deviation, COPD: Chronic Obstructive Pulmonary Disease

**Table 2. Post-Operative Complications Among Super-Obese, Morbidly Obese, Obese, and Non-Obese Patients After Total Hip Arthroplasty**

	Super Obese (BMI > 50) (n = 814)	Morbidly Obese (BMI 40 to 49) (n = 5,250)	Obese (BMI 30 to 40) (n = 12,443)	Non-Obese (BMI < 30) (n = 8,680)	p-value
All Complications	35 (4.3)	32 (0.6)	17 (0.1)	17 (0.2)	<0.01
Periprosthetic Joint Infections	17 (2.1)	17 (0.3)	17 (0.1)	17 (0.2)	<0.01
1 Year	17 (2.1)	17 (0.3)	17 (0.1)	17 (0.2)	<0.01
2 Years	17 (2.1)	17 (0.3)	17 (0.1)	17 (0.2)	<0.01
Sepsis Events	17 (2.1)	17 (0.3)	17 (0.1)	17 (0.2)	<0.01
Pulmonary Emboli	17 (2.1)	17 (0.3)	17 (0.1)	17 (0.2)	<0.01
DVTs	17 (2.1)	17 (0.3)	17 (0.1)	17 (0.2)	<0.01
Pneumonia	17 (2.1)	17 (0.3)	17 (0.1)	17 (0.2)	<0.01
Respiratory Failures	17 (2.1)	17 (0.3)	17 (0.1)	17 (0.2)	<0.01
Revisions	17 (2.1)	17 (0.3)	17 (0.1)	17 (0.2)	<0.01
1 Year	17 (2.1)	17 (0.3)	17 (0.1)	17 (0.2)	<0.01
2 Years	17 (2.1)	17 (0.3)	17 (0.1)	17 (0.2)	<0.01

BMI: Body Mass Index, DVTs: Deep Vein Thromboses

**Table 3. Unadjusted Odds Ratios for Complications After Total Hip Arthroplasty Among Patients who have Obesity**

	Super Obese	Morbidly Obese	Obese
All Complications	2.69 (2.31-3.14)	2.00 (1.84-2.17)	1.00 (0.94-1.09)
Periprosthetic Joint Infections	2.70 (2.46-2.99)	2.00 (1.81-2.20)	1.00 (0.91-1.10)
1 Year	2.70 (2.46-2.99)	2.00 (1.81-2.20)	1.00 (0.91-1.10)
2 Years	2.70 (2.46-2.99)	2.00 (1.81-2.20)	1.00 (0.91-1.10)
Sepsis Events	1.69 (1.01-2.84)	1.24 (0.93-1.66)	1.00 (0.71-1.43)
Pulmonary Emboli	2.78 (1.74-4.37)	1.51 (1.06-2.15)	1.00 (0.67-1.47)
DVTs	1.14 (0.87-1.49)	1.13 (0.92-1.41)	1.00 (0.81-1.24)
Pneumonia	0.77 (0.41-1.34)	0.83 (0.51-1.39)	0.69 (0.46-1.04)
Respiratory Failures	1.39 (0.82-2.36)	1.20 (0.91-1.58)	0.91 (0.71-1.16)
Revisions	1.48 (0.89-2.49)	1.41 (1.12-1.69)	0.91 (0.71-1.16)
1 Year	1.48 (0.89-2.49)	1.41 (1.12-1.69)	0.91 (0.71-1.16)
2 Years	1.57 (1.07-2.29)	1.41 (1.12-1.70)	1.01 (0.81-1.20)

\* Non-obese patients served as the comparison group. Number represents odds ratio and 95% confidence interval.  
DVTs: Deep Vein Thromboses

**Table 4. Unadjusted Odds Ratios for Complications After Total Hip Arthroplasty Among Patients who have Obesity**

	Super Obese	Obese
All Complications	1.25 (1.16-1.35)	0.51 (0.47-0.55)
Periprosthetic Joint Infections	1.43 (1.32-1.54)	0.50 (0.46-0.54)
1 Year	1.43 (1.32-1.54)	0.50 (0.46-0.54)
2 Years	1.56 (1.32-1.81)	0.50 (0.46-0.54)
Sepsis Events	1.35 (0.80-2.31)	0.80 (0.61-1.06)
Pulmonary Emboli	1.93 (1.00-3.64)	0.73 (0.56-0.96)
DVTs	1.16 (0.74-1.83)	0.91 (0.71-1.17)
Pneumonia	0.91 (0.51-1.66)	0.81 (0.61-1.07)
Respiratory Failures	1.16 (0.68-1.99)	0.76 (0.59-0.99)
Revisions	0.92 (0.51-1.54)	0.58 (0.44-0.74)
1 Year	0.92 (0.51-1.54)	0.44 (0.31-0.76)
2 Years	1.08 (0.74-1.59)	0.70 (0.58-0.84)

\* Morbidly obese patients served as the comparison group. Number represents odds ratio and 95% confidence interval.  
DVTs: Deep Vein Thromboses