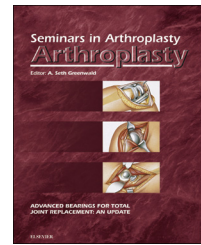


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## Morbid obesity in total hip arthroplasty: What does it mean?

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### ABSTRACT

Obesity affects 34% of the U.S. population, and the number of obese patients undergoing elective total hip arthroplasty (THA) is increasing each year. The objective of this study is to summarize the current scientific findings regarding the outcomes of THA in the morbidly obese (BMI > 40 kg/m<sup>2</sup>) patients. Specifically, our goal is to identify the incidence of complications and the influence on clinical and functional outcome measures in morbidly obese patients undergoing elective primary THA. A systematic review was performed identifying all of the studies from the PubMed, Medline, EBSCO and Cochrane Library databases that reported outcomes of primary THA in morbidly obese [body mass index (BMI) ≥ 40 kg/m<sup>2</sup>] patients. We identified 13 articles that met inclusion criteria for systematic review. These studies included 15,906 primary THAs in morbidly obese patients. Morbidly obese patients underwent THA at a significantly younger age compared to the non-morbidly obese cohort (63 years versus 70 years) comparator group. Eleven of the 13 studies reported complication rates in morbidly obese versus non-obese patient cohorts. Eight of the 11 studies reported increased complication rates in morbidly obese patients. Of the 13 studies, 9 had documented outcome scores in morbidly obese patients. All studies concluded that morbidly obese patients had the poorest overall preoperative and postoperative functional scores. Seven of the studies also documented the net gain in functional scores after THA between the morbidly obese and the non-morbidly obese groups. No difference was found between the groups. Morbidly obese patients undergo primary THA at a significantly younger age than non-obese patients. Furthermore, morbidly obese patients have a higher perioperative complication rate. Overall outcome measures are worse in the pre-operative and the post-operative phase in the short- and the medium-term follow-up time intervals. However, morbidly obese patients have similar functional gains as non-morbidly obese patients following THA.

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### 1. Introduction

The number of THAs has continued to increase in the U.S. with the aging population. Moreover, THA has been extended

to the younger patient population. The advent of the bundle payment system along with the current medical utilization trend has placed considerable pressure on arthroplasty surgeons to shorten hospital length of stay (LOS) while

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simultaneously achieving an accelerated functional recovery. In the US, obesity affects 35% of the population [1]. In arthroplasty clinics in the US, the prevalence of obesity has been reported as high as 54% [2]. This has pushed arthroplasty surgeons to risk stratify each patient individually in order to reduce the complications following THA. The current literature has substantial evidence validating that there is a trend of worse outcomes and higher complication rates in THA when done in morbidly obese patients. The reported results, however, are not entirely in consensus. We performed a systematic review of available evidence to determine how morbid obesity impacts outcomes and complications in THA. Our hypothesis is that morbidly obese patients have notably worse outcomes and higher complication rates than their non-obese counterparts.

## 2. Patients and methods

We performed a systematic review of the published studies using the preferred reporting items for systematic reviews and meta-analysis (PRISMA) guidelines [3]. We used the following search terms: “morbidly obese”, “obese” AND “total hip”, “obesity” AND “hip arthroplasty”, “THA”, “BMI” and “body mass index”. Search terms were used in the Cochrane Library Database, Pubmed, Medline, and Ebsco from inception to 2017. We only included studies in the English language and cross-referenced every article in the initial search to ensure appropriate inclusion. Inclusion criteria for the systematic review required studies to define morbid obesity as a BMI  $\geq 40$  kg/m<sup>2</sup>. All studies were required to have outcome data analysis on either complication rates or clinical and functional outcome scores. Each study must have clearly defined their outcomes data to be specific to the morbidly obese patients in their study. Studies of expert opinions, systematic reviews and meta-analyses were excluded and failure to report outcomes specific to morbidly obese patients were also excluded. Quality assessment and data extraction were performed by two authors (J.R. and T.B.). Independent data analysis documented complication rates and outcome measures for all eligible studies. In addition to calculating the mean age at time of surgery for morbidly obese patients we also identified net improvements in functional outcomes scores before and after THA.

## 3. Results

Initial database queries identified 1382 studies. This was subsequently reduced to 814 studies following duplicate removal. After screening articles based on titles and abstracts, we excluded an additional 757 studies. This left 57 studies. These were read in their entirety and after following PRISMA guidelines and inclusion/exclusion criteria, we identified 13 studies to be included in the systematic review [4-17]. These 13 studies included 15,906 morbidly obese patients who underwent primary elective THA (Fig. 1, Table 1).

Seven of the 10 studies documented the age of the patients at the time of surgery. The mean age of morbidly obese

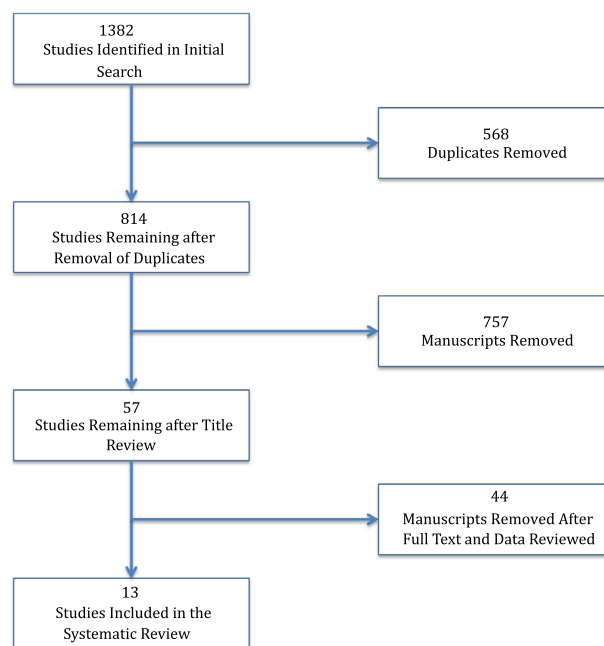


Figure 1 – Breakdown of literature review.

patients was 63 years at time of primary THA. This was younger than the mean age of non-obese patients 70 years.

Andrew et al reported that the mean age of THA to be slightly under 61 years in morbidly obese versus 69.1 years in the non-obese group [5]. McCalden et al. reported younger age in a series of 206 morbidly obese patients who underwent THA in morbidly obese patients compared to a non-obese patient cohort (60 years vs 71 years, respectively) [8].

Studies of morbidly obese patients undergoing total knee arthroplasty (TKA) have reported high complication rates when compared to non-obese TKA patients. Amin et al. [15] found the complication rate to be as high as 32% in 41 morbidly obese TKA patients compared to 0% in a matched control group of 41 non-obese patients. Eleven of the 13 studies documented the complication rates between morbidly obese and non-morbidly obese patients undergoing THA. Eight of those 11 studies reported a clear increase in complication rates among the morbidly obese patients.

Chee et al. reported nearly a four-fold increase in complication rate in a morbidly obese group versus a non-obese group (22% versus 5%,  $p = 0.012$ ) Using Kaplan-Meier survival analysis, investigators demonstrated the 5-year implant survival rate was 90.9% in the morbidly obese group compared to 100% survival in the non-obese group [6]. Hanley et al. reported a 22% increase in operative time. They also reported nearly a five-fold increase in 30-day readmission rate in morbidly obese patients. The majority of complications in this study were attributed to superficial and deep wound healing issues [8].

When comparing morbidly obese patients to non-obese patients, Dowsey et al. [7] reported that the odds ratio of having any postoperative complication was significantly greater in morbidly obese patients [OR, 5.77 (95% CI: 2.10–15.86)]. Meller et al. [11] reported that morbidly obese patients had increased postoperative complications including wound dehiscence [hazard ratio (HR) = 3.91], prosthetic joint

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