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ORIGINAL ARTICLE

Systematic Review of Outcomes of Total Hip Arthroplasty in Morbidly Obese Patients

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Abstract

Background: ***Total hip arthroplasty (THA) has been proven to be an effective therapy for severe hip OA. It is also used to improve mobility and lessen discomfort in the elderly. Due to its demonstrated efficacy in improving patient quality of life, THA demand has risen over time.***

Aim and objectives: ***To analyze the pre-, intra-, and postoperative clinical and radiological results and complications of THA in morbidly obese individuals.***

Subjects and methods: ***899 items could have been relevant to the initial search; however, after screening the titles and abstracts, 883 were found unsuitable. The remaining 16 papers were also analyzed. Sixteen studies were included: 14 were retrospective, and two were prospective.***

Results: ***The mean KSS score pre-treatment was 52.5 and improved to 86.5 post-treatment; the preoperative range of the flexion arc was 84 and changed to 109 postoperatively; the mean preoperative Harris Hip score was 41.1 and improved to 78.9 postoperatively. The total number of complications was 311 in the form of wound necrosis in 18 cases, UTI in 2 cases, AKI in 2 cases, periprosthetic joint infection in 7 cases, paresthesia in 8 cases, and GT avulsion in 2 cases.***

Conclusion: ***According to the literature, morbidly obese people experience a higher revision rate after primary THA than non-obese cases. Participants with a high BMI benefit from the same level of pain relief and enhancement in quality of life from this medication as those with a normal BMI.***

Keywords: Total Hip Arthroplasty, Obese Patients, Osteoarthritis

1. Introduction

THA is frequently the last resort for older patients with severe hip osteoarthritis (OA) when conservative therapy options have failed to reduce their pain and immobility. Since total hip arthroplasty has been shown to improve patients' quality of life significantly, demand for the treatment has skyrocketed. As a result, total hip arthroplasty is likely to see a dramatic uptick in demand in the coming years. [1,2]

This rise can be attributed to several conditions and risk factors, the most significant of which are mechanical factors. Such factors involve traumatic injuries, malformations, intense physical stress at work, and aging, all of which, in addition to favoring the development of disorders of the musculoskeletal system, entail a variety of comorbidities in other systems. As a direct consequence of this, overweight and obesity are quickly becoming increasingly significant issues in our modern culture. These situations lead to a non-physiological overload, which can lead to joint damage when left untreated for an extended period of time. [3]

Overweight patients are a severe concern for orthopedists nowadays. Total hip arthroplasty, in particular, is connected with a higher probability of having perioperative problems in individuals with a higher body mass index (BMI). Obesity may affect THA results, but this is debatable. [4]

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Some research indicates that obese patients are more likely to experience issues during surgery, including those related to anesthesia, hospitalization, wound healing, and length of stay. [5]

It has also been shown that the incidence of periprosthetic infections, dislocations, and instability is all higher in obese patients who have had complete hip arthroplasty. It is not yet known, however, how clinically and functionally successful primary total hip arthroplasty is for morbidly obese individuals. 6

The reason for doing this analysis was to analyze the pre-, intra-, and postoperative clinical and radiological results and complications of THA in morbidly obese individuals.

2. Patients and methods

The Cochrane Collaboration's guidelines were the basis for our systematic review search technique. To determine the revision rate following primary total hip arthroplasty in morbidly obese patients, we searched three electronic databases: PubMed, EMBASE, and PubMed Central.

To increase both sensitivity and specificity, the following text was employed:

Obesity and hip surgery are both included in the phrase "hip arthroplasty OR THR OR THA OR hip replacement) and (obesity OR obesity." The period frame for the research spanned from 2010 to 2022 when the databases were searched.

Search strategy: An initial database search returned 899 possibly relevant publications, of which 883 were explicitly disqualified after being screened for titles and abstracts. The remaining sixteen papers were reviewed.

Study characteristics: 16 studies were included, 14 were retrospective, and two were prospective.

Eligibility criteria: Before searching, the authors agreed on the criteria that would determine eligibility. Studies published in the English literature have examined the revision rate of total hip arthroplasty in obese patients (stratified by BMI). Research with a mean follow-up duration of less than two years was not included.

Research that met all inclusion criteria was identified by reviewing the titles and abstracts, and then all the papers were read. Articles were evaluated for relevance, and those that did not cut were removed at the authors' discretion. The remaining papers' reference lists were assessed manually to find any other pertinent papers that had been missed during the database search.

Data extraction: The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines must be rigorously adhered to. Our primary endpoint is the rate of primary THA revisions, and our secondary endpoint is hip function after surgery. When further information was needed, we contacted the research's authors.

Ethical consideration: Before beginning this research project, permission was acquired from the Institutional Review Board committee at AL-Azhar University's Damietta College of Medicine.

Statistical analysis: SPSS (IBM's Data was collected and analyzed using SPSS (Statistical Software for the Social Sciences; Armonk et al.), version 20. The student t-test was used to contrast the quantitative data's means ± standard deviations (SDs). Numbers and percentages are used to denote nominal data. The Chi2 test was performed on these records. We used ROC curve analysis to determine how well different parameters could predict GIT bleeding. Then, we used logistic regression to determine what factors could predict GIT bleeding in CKD patients. P values less than 0.05 were considered statistically significant since a 95% confidence interval was employed.

3. Results

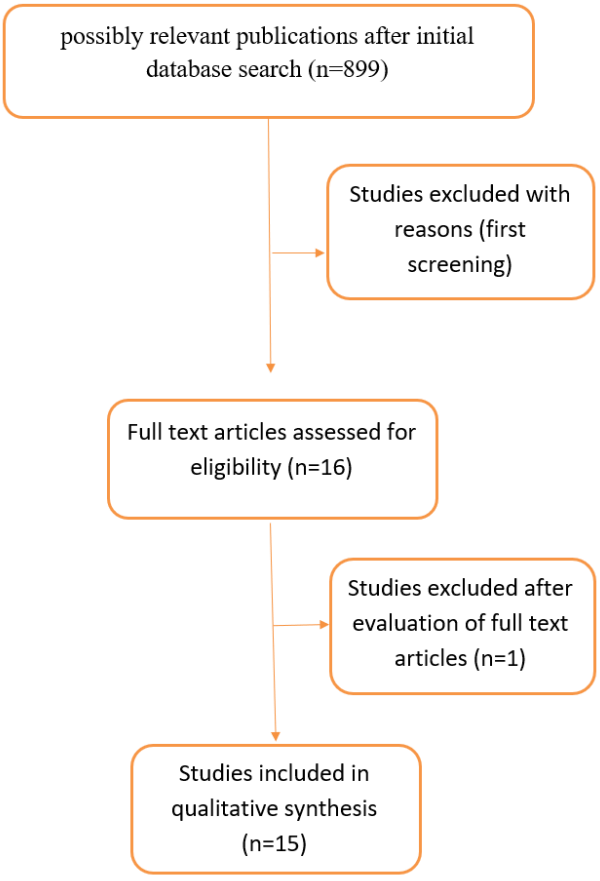

Table 1 illustrates that the total number of cases was 3707, with a mean age of 61.18 years and a mean BMI of 44.5.

Table 2 illustrates that the mean KSS score pre-treatment was 52.5 and improved to 86.5 post-

treatment, the preoperative range of flexion arc was 84 and changed to 109 postoperatively, and the mean pre-operative Harris Hip score was 41.1 and improved to 78.9 post-operatively.

Table 3 illustrates that the average operative time was 114.2 minutes, and the average hemoglobin level was 13.9 preoperatively but 10.8 after the operation.

Table 4 shows that the total number of complications was 311 in the form of wound necrosis in 18 cases, UTI in 2 cases, AKI in 2 cases, periprosthetic joint infection in 7 cases, paresthesia in 8 cases, GT avulsion in 2 cases, wound infection in 78 cases, polyethylene wear in 18 cases, instability in 18 cases, osteolysis in 14 cases, component malpositioning in three patients, arthrofibrosis in two patients, and embolism\DVT in 9 patients.

Table 5 illustrates fracture in 25 cases, aseptic loosening in 38 cases, ileus in 1 case, hematoma and seroma in 9 cases, dislocations in 57 cases, and revision in 232 cases.

Table 1. Patient's characteristics

AUTHOR	NUMBER	AGE	M\F	BMI
ARGYROU C ET AL. [7]	86	64.9	39\47	42.33
TOHIDI M ET AL. [8]	726	60.6	262\464	>45
CARTER J ET AL. [9]	141	61.4	48\93	44.4
SISKO ZW ET AL. [10]	67	66.3	21\46	43.9
SKUTEK M ET AL. [11]	25	61.6		38.4
HANLY RJ ET AL. [12]	39	61.4	9\30	43.6
SAYEED Z ET AL. [13]	748	63.33	107\641	40
ISSA K ETAL. [14]	45	54		50
WATTS CD ET AL. [15]	123	59	48\75	44
HOUDEK MT ET AL. [16]	33	63.2	14\19	44.9
PULOS N ET AL. [17]	50	59.1	18\32	42.1
ARSOY D ET AL. [18]	42	56.4	11\29	53.2
NAZIRI Q ET AL. [19]	95	60	21\74	54
MCCALDEN RW T AL. [20]	1431	63	700\731	>30
CHEE YH ET AL. [21]	56	63.6	12\41	37.9

Table 2. Outcome scores

AUTHOR	KSS PRE	KSS POST	BEFORE OPERATIVE RANGE OF FLEXION ARC	AFTER OPERATIVE RANGE OF FLEXION ARC	BEFORE OPERATIVE HARRIS HIP SCORE	AFTER OPERATIVE HARRIS HIP SCORE
ARGYROU C ET AL. [7]						
TOHIDI M ET AL. [8]						
CARTER J ET AL. [9]						
SISKO ZW ET AL. [10]						
SKUTEK M ET AL. [11]					36.8±6	87±9
HANLY RJ ET AL. [12]						
SAYEED Z ET AL. [13]						
ISSA K ETAL. [14]					39	82
WATTS CD ET AL. [15]					49.6	72.7
HOUDEK MT ET AL. [16]					50.6	64.3
PULOS N ET AL. [17]						
ARSOY D ET AL. [18]					33.9±12.8	74.9±16.5
NAZIRI Q ET AL. [19]	52.5	86.5	84	109		
MCCALDEN RW T AL. [20]					39.9	86.4
CHEE YH ET AL. [21]					37.9	85.5

Table 3. Operative time and hemoglobin level changes

AUTHOR	OPERATION TIME \MIN	HAEMOGLOBIN (MG/DL) PRE	HAEMOGLOBIN (MG/DL) POST
ARGYROU C ET AL. [7]	70.12	13.93 (1.29)	11.13 (1.00)
TOHIDI M ET AL. [8]			
CARTER J ET AL. [9]			
SISKO ZW ET AL. [10]			
SKUTEK M ET AL. [11]	92±18	13.9±0.6	10.6±0.8
HANLY RJ ET AL. [12]	122		
SAYEED Z ET AL. [13]			
ISSA K ETAL. [14]			
WATTS CD ET AL. [15]			

HOUDEK MT ET AL. [16]	
PULOS N ET AL. [17]	184
ARSOY D ET AL. [18]	
NAZIRI Q ET AL. [19]	98
MCCALDEN RW T AL. [20]	
CHEE YH ET AL. [21]	97

Table 4. complications

AUTHOR	COMPLICATION	WOUND NECROSIS	UTI	AKI	PERIPROSTHETIC JOINT INFECTION	PARESTHESIA	GT AVULSION	WOUND INFECTION	POLYETHYLENE WEAR	INSTABILITY	OSTEOLYSIS	COMPONENT MALPOSITIONING	ARTHROFIBROSIS	EMBOLISM\DVT
ARGYROU C ET AL. [7]	14				1	3	2	7						
TOHIDIM ET AL. [8]	32													
CARTER J ET AL. [9]	27				6			9						4
SISKO ZW ET AL.[10]	87							20	17	14	7	3	2	
SKUTEKM ET AL. [11]	2					1		1						
HANLY RJ ET AL. [12]	4	4												
SAYEEDZ ET AL. [13]	10							10						
ISSA K ETAL. [14]	0													
WATTS CD ET AL. [15]	62					3		5	1		7			3
HOUDEK MT ET AL. [16]	15							6						
PULOS N ET AL.[17]	19	11								4				
ARSOYD ET AL. [18]	17					1		11						
NAZIRIQ ET AL. [19]	10	3	2	2				1						1
MCCALDEN RW T AL.[20]	0													
CHEEYH ET AL. [21]	12							8						1

Table 5. Revision rate

AUTHOR	NUMBER	FRACTURE	ASEPTIC LOOSENING	ILEUS	HEMATOMA\SEROMA	DISLOCATIONS	REOPERATION
ARGYROU C ET AL. [7]	86	1					5
TOHIDI M ET AL. [8]	726					32	58
CARTER J ET AL. [9]	141		2		6		0
SISKO ZW ET AL. [10]	67		24				30
SKUTEK M ET AL. [11]	25						0
HANLY RJ ET AL. [12]	39						5
SAYEED Z ET AL.[13]	748						0
ISSA K ETAL. [14]	45						2
WATTS CD ET AL. [15]	123	22	4		2	15	15
HOUDEK MT ET AL. [16]	33	1	4			4	14
PULOS N ET AL. [17]	50	1	3				23
ARSOY D ET AL. [18]	42		1		1	3	4
NAZIRI Q ET AL. [19]	95			1			1
MCCALDEN RW T AL. [20]	1431						70
CHEE YH ET AL. [21]	56					3	5

4. Discussion

The number of THA surgeries conducted in England and Wales in 2015 was 98,211. This makes THA one of the most frequently performed and successful operations. Globally, THA demand is on the rise; the US is expected to see a 173 percent increase from 2005 levels to 572,000 by 2030, Sweden will see a rise from 16,000 THA operations in 2010 to 20,000 in 2030, and Australia will see a 219 percent rise in primary THA from 2013 until 2046. [22]

The main results of the study were the following:

The total number of cases was 3707, with a mean age of 61.18 years and a mean BMI of 44.5. The mean follow-up period was 5.2 years, the mean hospital stay was 5.4 days, and the most common comorbidities were HTN, DM, CAD, ESRD, AF, arthritis, smoking, anemia, CVD, cancer, thyroid, respiratory, hepatic, and renal.

In the study of McCalden et al., people with extreme obesity were the recipients of 206 (6.3% of all) THRs. The proportion of females was highest in the standard, underweight, and severely obese categories (chi-square test, $p < 0.001$). Individuals classified as severely obese tended to be younger than those classified as obese, overweight, average, or underweight ($p < 0.001$). [20]

Cases in the research by Skutek et al. had an average BMI of 38±4 kg/m2 (group A), with twenty of them being obese and five of them being severely obese. The 25 cases in control group B were evenly split between the nine normal-weight cases and the sixteen overweight cases in the matched control group. The average BMI is 27±2 kg/m2. The average follow-up was 30±6 months.[11]

The results of this study showed that the mean KSS score before treatment went from 52.5 to 86.5 after treatment, the range of flexion arc before surgery went from 84 to 109 after surgery, and the mean Harris Hip score before surgery went from 41.1 to 78.9 after surgery.

Similarly, eight papers were total in the meta-analysis Barrett et al. showed. There were 66,238 THAs in the severely overweight category, compared to 705,619 THAs in the normal weight category. All studies showed that HHS increased following THA. The median pre-operative HHS was 36.5 in the grossly obese group and 45.5 in the non-obese group. The median postoperative HHS was 82.1 in the morbidly obese group and 90.2 in the non-obese group. The median difference between pre-and postoperative HHS was 45.6 in the morbidly obese group and 44.8 in the non-obese group. The improvement in HHS between pre-and postoperative periods among the morbidly obese was found in all investigations to be at least as large as that seen among the non-obese controls.[23]

This research showed that the mean operative time was 114.2 minutes, and the mean hemoglobin level was 13.9 pre-operation but 10.8 after operation.

According to our results and the study of Skutek et al., there was no statistically significant variance among the two groups before and after surgery, with hemoglobin dropping from 13.9± 0.6 g/dL to 10.6±0.8 g/dL in Group A and from 13.8±1 g/dL to 10.2±0.6 in Group B ($P > 0.05$). No one in either group needed a transfusion of blood.[11]

Our results showed that regarding complications, the total number of complications was 311 in the form of wound necrosis in 18 cases, UTI in 2 cases, AKI in 2 cases, periprosthetic joint infection in 7 cases, paresthesia in 8 cases, and GT avulsion in 2 cases. Wound infection in 78 cases, polyethylene wear in 18 cases, instability in 18 cases, osteolysis in 14 cases, component malpositioning in three patients, arthrofibrosis in two patients, and embolism\DVT in 9 patients. Regarding revision rate, there were fractures in 25 cases, aseptic loosening in 38 cases, ileus in 1 case, hematoma and seroma in nine patients, dislocations in 57 patients, and revision in 232 patients.

While Watts and colleagues observed no variation in the frequency of survival free of reoperation or re-revision across the groups in their investigation, they found no variance in the survivability rate overall. In the group of patients who were severely obese, there were 15 (12%) cases who needed a reoperation, while 22 (18%) cases who were not fat underwent at least one reoperation (HR 1.5, $p = 0.27$). Five patients with PJI, five with aseptic loosening, four with periprosthetic femur fractures, two with instability, and two with wound complications were re-operated. Thirteen patients who were not morbidly obese were re-operated because of aseptic loosening, six with periprosthetic femur fractures, three with instability, two with osteolysis, two with wound complications, and two with PJI. Similarly, the re-revision rate among morbidly obese cases and non-obese individuals was comparable (10% vs. 13%, HR 1.4, $p = 0.37$). The most common causes of revision surgery in the morbidly obese group were aseptic loosening ($n = 5$), instability ($n = 3$), periprosthetic femur fracture ($n = 2$), and PJI ($n = 1$). In the non-obesity group, the most common causes of revision surgery were aseptic loosening ($n = 13$), instability ($n = 2$), and osteolysis ($n = 1$). Five-, ten-,and fifteen-year reoperation and revision-free survival rates were comparable across groups.[15]

According to Houdek et al., re-infection rates

were significantly higher in morbidly obese patients (18% vs. 2%, p 0.005), as were revision rates (42% vs. 11%, p 0.001) and reoperation rates (61% vs. 12%, p 0.001).[16]

According to Sisko et al., the morbidly obese group had a significantly higher frequency of reoperation (34.5 percent [30/87] vs. 16.1 percent [14/87], P =.005) and re-revision (27.6 percent [24/87] vs. 12.6 percent [11/87], P =.014), as well as a significantly lower 10-year survival rate for reoperation (P =.05) & subsequent revision (P =.014). Mainly, the aseptic sub-group had a higher frequency of reoperation (29.9 percent [20/67] vs. 13.4 percent [9/67], P =.021) and re-revision (26.9% [18/67] vs. 11.9 percent [8/67], P =.029).[10]

More so, Argyrou et al. found no significant variations in blood loss, intra-postoperative problems, or implant location among the two groups. The rate of superficial wound infection was significantly greater in the obese group (8.1%) in contrast to the non-obesity group (1.2 percent) (p = 0.007), and the relative risk of reoperation was 2.59 (95 percent confidence interval: 0.68 to 9.91). Onlyrosthetic joint infection was observed among the obese participants.[7]

Limitation Of Study : This study lacked homogeneity in the types of prostheses used, the approach to the hip, and the definition of morbid obesity, though this may be representative of the differing practices between hospitals. Most studies reported a follow-up of approximately five years

4. Conclusion

According to the literature, morbidly obese people experience a higher revision rate after primary THA than non-obese cases. Participants with a high BMI benefit from the same level of pain relief and enhancement in quality of life from this medication as those with a normal BMI.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article

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Conflicts of interest

There are no conflicts of interest.

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