Hip arthroplasty in obese patients: rising prevalence–standard procedures?

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Abstract

We examined our experience and, in particular, complications associated with total hip arthroplasty in obese and morbidly obese patients. We prospectively gathered 50 patients in a matched control series including 25 obese and morbidly obese patients. All patients were operated using the direct lateral approach and standard postoperative protocols. Operating room time, complications, dislocations, blood loss, cup position and clinical parameters using the Harris Hip Score and the Western Ontario and McMaster Universities Arthritis Index results were compared. Although there were some significant differences in clinical outcomes, standard procedures yielded good overall results and an acceptable rate of complications. Details approaching this patient entity are being discussed.

Introduction

The prevalence of obesity has risen substantially in Germany over the last 10 years. Using the calculated body mass Index (BMI), obesity is defined as a BMI ≥30 kg/m^2. According to the German Health Interview and Examination Survey for Adults (DEGS1), conducted from 2008 through 2011, the prevalence of overweight (BMI ≥25 kg/m^2 remained with 67.1% of men and 53.0% of women the same over the last years. However current data present a substantial increase of obese men from 18.9% to 23.3% and in women from 22.5% to 23.9% compared to the previous survey in 1998.[1] The increase in obesity occurred especially among young adults.[1,2] Simultaneously higher BMI lead to endoprosthetic treatment in younger age, which is carried out at significantly lower levels of preoperative joint function.[3]

Previous studies and current meta analyses report a higher risk of total hip replacements (THA) when being performed in obese patients. Factors associated with THA in these patients and potential complications comprise increased risk for re-operation and infection,[4-6] prolonged operating room (OR) time,[7,8] expectations of poorer clinical outcomes,[9] risk of component malpositioning[10] and risk of dislocation.[11] In order to reduce these risks, measures such as pre-operative weight loss regimes[12] and avoiding the use of minimally invasive approaches have been advocated.[13,14]

Given the current prevalence of obesity in Germany, we undertook a closer observation of our current standard procedure for THA. We queried, if obesity with an BMI >30 kg/m^2 affected the results of THA in our patients compared to patients without obesity (BMI <30 kg/m^2) and whether there was a need to alter procedures or decision making in this group?

Materials and Methods

Fifty consecutive patients with severe osteoarthritis were identified performing a match-control analysis (09/2011-09/2013). There were 18 men and 32 women. The mean age was 65±11 years at the time of operation. All patients suffered from primary osteoarthritis either with normal or dysplastic hip joints. Patients were referred to a referral center for total joint replacement (TJR) and operated by a single surgeon or a resident under direct supervision. Twenty-five consecutive patients with a BMI >30 kg/m^2 were included and matched to the next consecutive patient with a BMI <30 kg/m^2. Patients were graded using the WHO scheme into normal and overweight grade 1-3, also called simple overweight – BMI of 25-29.9 kg/m^2, obesity –BMI of 30-39.9 kg/m^2 and morbid obesity – BMI 40 kg/m^2. IRB was consulted (No. 2989-2015).

The operative technique and implants were the same both in overweight and (morbidly) obese patients. The direct lateral approach as described by Hardinge was used. Patients were prepped and draped in the lateral decubitus position using an additional iodine draping. Cefuroxime single shot prophylaxis was administered with adapted dosage in morbidly obese patients. Jet lavage was used in all cases. The Implant was a press fit cementless implant using a delta ceramic head (32 mm) and a cross-linked polyethylene insert. Fluoroscopy was applied in all cases, after placing the definitive cup and before inserting the definitive stem with a trial rasp instead. This was done to leave options for small corrections of the press fit cup and to adjust the size and position of the stem and also to optimize the offset and leg length. We used wound dressing consisting of a highly absorbent pad, maximizing the passage of blood and exudate into the dressing, minimizing the risk of fluid strikethrough. Therefore reducing the need for dressing changes.

OR time, fluoroscopy time, pre and postoperative hemoglobin levels, postoperative cup inclination (aimed between 30-45° inclination) was noted. At final follow up, the Harris Hip Score (HHS) and a modified Western Ontario and McMaster Universities Arthritis Index (WOMAC) (max. 100 pt. = excellent) were calculated. Statistics comparisons were made using the t-test (two tailed) and P<0.05. Potential complications (wound dehiscence, infection, dislocation, DVT) were noted.

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Results

According to the WHO grading, there were 20 obese patients and 5 morbidly obese patients, adding up to 25 patients with a mean BMI of 38±4 kg/m^2 (group A). In the matched control group, there were 9 patients with normal weight and 16 overweight patients adding up to 25 patients in control group B. The mean BMI of 27±2 kg/m^2 (Table 1). After a mean follow-up of 30±6 months, overall satisfaction was similar in Group A and B. On a scale from 1 (very satisfied to 10 not satisfied) there was a mean of 1.6±0.6 in group A and 1.8±0.6 in group B. Patients who were working were able to return to their respective work after 3 months regardless of BMI. There was no postoperative Trendelenburg gait in either group. Postoperatively, there were no deep vein thromboses, dislocations or general medical complications. Hemoglobin dropped from a preoperative level of 13.9±0.6 g/dL to a postoperative level of 10.6±0.8 g/dL in Group A and from 13.8±1 g/dL to 10.2±0.6 in Group B,

demonstrating no significant difference (P>0.05). No patient in either group required blood transfusion.

Overall post-operative outcome score results improved in both groups. In group A from pre-op 38±6 to post-op 89.5±7 (WOMAC) and 36.8±6.2 to 87.9 (HSS). Both increases were statistically significant (P<0.01, Table 2). Similar increase was noted in Group B from pre-op 49.6±11 to 93±8 (WOMAC) and 48.8±12 to 92±6 (HHS). Again the increase was statistically significant (P<0.01, Table 2).

The HHS showed significantly better results in the non-obese group B (92±6 *vs*. 87±9, P=0.02, Table 2). The WOMAC also improved more in non-obese group B patients though not reaching statistical significance (89.5±7 *vs*. 93±8, P=0.2). Interestingly the pre-op WOMAC and HHS scores were significantly decreased in the obese group A, compared to the non-obese group B (P=0.01, WOMAC and HHS).

In the obese Group A there was also a significant longer skin incision in total 23±4 cm *vs*. 14±1.3 cm, P<0.05 (Figure 1, Table 3). Also OR time was significantly increased in group A (92±18) *vs*. group B (77±10, P<0.01). Similar tendencies were observed by Bennet.[15]

Some authors noted an increased utilization of operating room time in patients with increased BMI during primary total hip arthroplasty.[7,8,15] That in turn might contribute to an increased risk of infection as noted by Belmont. He found that morbid obesity (P<0.001) and operative time >141 minutes (P<0.001) were strongly associated with the development of major local complications.[5] Compared to these data, the OR time for obese and morbidly obese patients was relatively low (92±18 minutes, Table 3). Even in morbid obese Patients OR times less than 80 minutes were possible.

One obese Patient (m, BMI 34) developed a superficial skin infection following wound dehiscence while training on an ergometer 2 weeks post surgery. Prophylactic antibiotics were given. The skin healed uneventfully, with no need for revision surgery.

Given our results, OR time was moderately longer in obese and MO patients. In this series we had no infections though our numbers were small. The incidence should change with increased numbers necessarily. No significant differences were noted in terms of cup inclination (Table 3, Figure 2). The standard exposure ensures correct sizing and placement of the cup under direct vision and also allows access for correct insertion of the appropriately sized stem without compromising soft tissue, bone or tendons. This has happened in some minimally invasive techniques, though.[16] There is no role for minimally invasive techniques in this patient cohort, and we support this approach. Another patient had a meralgia

Table 1. Demographic data, body mass index (BMI) and WHO criteria defining groups A+B.

	Group A (BMI>30)	Group B (BMI<30)
Normal weight	-	9
Overweight	-	16
Obese	20	-
Morbidly obese	5	-
Age, years	61.6±11.8	69.1±10.5 P=0.02
BMI, mean	38±4 kg/m^2	27±2 kg/m^2 P<0.01

Table 2. Score results in Group A and B. Significantly better results in Group B (Harris Hip Score, HHS; P<0.05). Group A had markedly lower pre-operative score results, compared to group B (P=0.01). Pre- and post-operative Western Ontario and McMaster Universities Arthritis Index (WOMAC) and HHS showed significant gains both in group A and B (P<0.01).

	Group A (BMI>30)	Group B (BMI<30)
WOMAC pre	38.0±6	49.6±11
WOMAC post	89.5±7	93±8 P=0.2
HHS pre	36.8±6	49±12
HHS post	87±9	92±6; P=0.02

Table 3. Significantly smaller skin incision in group B (P<0.05) and also reduced operating room (OR) time (P<0.01) no differences in cup inclination.

	Group A (BMI>30)	Group B (BMI<30)
Skin incision, cm	23±4	14±1.3 P<0.05
OR time, min	92±18	77±10; P<0.01
Cup inclination,°	44.1±4.7	43±3.4; P=0.54

Figure 1. Skin incision directly related to body mass index in obese (A) and morbidly obese (B) patients.

paresthetica in the contralateral hip (f, BMI 37), which dissolved after 7 months. This has been described in other studies and is thought to be related to the lateral decubitus position.[17] In neither group were there DVT, dislocations or general medical complications at latest follow-up.

Discussion and Conclusions

The aim of this study was to assess the difference between obese and non-obese patients with respect to intra-operative and post-operative complications and post operative outcome scores for total hip arthroplasty. This is currently of particular relevance as the degree of obesity in the German community continues to increase, and predictions for our future requirement for total hip arthroplasty are to increase.[18,19]

Using our standard direct lateral approach for THA in obese patients we observed differences in the OR time, which was increased in obese and morbidly obese patients, however still with mean operative time close to 90 minutes. We also noted a longer skin incision, which we do not hesitate to use as necessary to make the access, view and operative time as favorable as possible. We definitely counsel against minimal invasive approaches.

The increased risk of infection should not be a barrier in these patients. Although there is ample evidence for increased infection and related problems in obese and MO patients,[4,6] other data show that THA can be safely performed in these patients with minimal increased risk, and this is supported by our data.

Using the direct lateral approach, a controlled extension of the skin incision when necessary provides excellent access. We feel that standardized procedures, avoiding minimally invasive or other less extensile approaches, help to keep OR time low and to reduce related risks such as infection, component malposition or fracture. Informed consent should strongly emphasize the increased risk of infection preoperatively.

Of all variables considered, high BMI is the most significant risk factor leading to malpositioning and or instability.[10,11,20,21] It is well recognized that component malposition is a crucial contributor to early dislocation and long term complications such as aseptic loosening.[13] We feel that the use of intraoperative fluoroscopy is a very useful adjunct to ensure correct uncemented stem size fill, and appropriate cup orientation, and in our study, no outliers in inclination and or rotational malposition occurred. Using the DLA without excision of anterior capsule with subsequent closure contributes to initial hip stability[16] and has low rates of instability. We had no abductor muscle repair failures, no Trendelenburg gaits and no dislocations in our study.

Nerve dysfunction has been reported in 2.8% using the DAA and is rarely seen in DLA. However having one patient with meralgia paresthetica on the contralateral site brings the focus to correct positioning and padding when operating in the lateral decubitus position.

After adjusting for covariates, the risk of SSI and readmission was not significantly different in the patients who gained or lost weight pre-operatively compared to those who remained the same in 4066 THAs (1/1/2008-12/31/2010).[12]

Even after surgery there appears to be a tendency to gain, rather than to loose weight. At 12-month follow-up, 18 obese or morbidly obese patients (9%) had lost ≥5% of their preoperative weight and 118 patients (25%) had gained ≥5% of their preoperative weight.[22] Considering these we recommend professional help for pre-operative weight reduction, however if these interventions fail, we then proceed with THA.

Patients with BMI >28 kg/m^2 showed greater improvements in function and in the physical component of general health after THA.[23] Although the clinical outcomes of primary THA were poorer in the super-obese patients, it is encouraging that even in these patients, THA can have acceptable outcomes. However, these patients may benefit from a discussion with their orthopedic surgeons to develop realistic expectations from the outcomes of their arthroplasty procedure.[9] While this is not a comparative study comparing other techniques with the standard procedures, we do plan to follow this cohort to assess medium and long term outcomes.

Our findings support those already published in the literature, that obese and morbidly obese patients benefit significantly from THA. It is our routine practice to inform obese patients about the known increased risks associated with THA surgery, and advocate weight loss therapy pre-operatively. This may include bariatric surgery such as sleeve gastrectomy. Never the less if surgery is performed in this patient group, acceptable outcomes can be achieved with low complication rates and improved quality for patients.

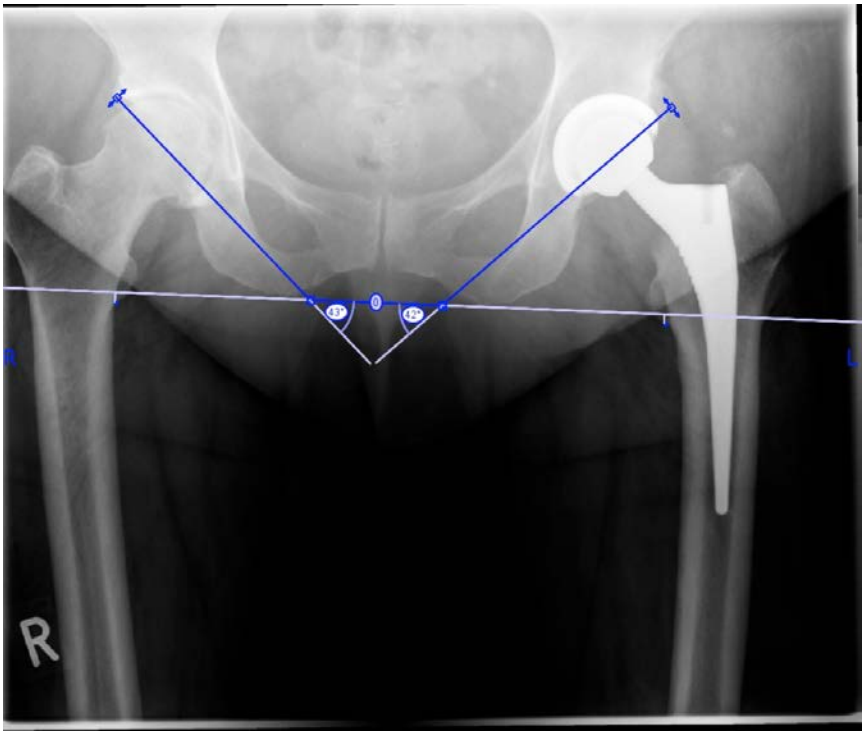

Figure 2. Correct cup inclination in a morbidly obese patient. Intraoperative fluoroscopy was performed initially.

References

1. Mensink GB, Schienkiewitz A, Haftenberger M, et al. [Overweight and obesity in Germany: results of the german health interview and examination survey for adults (DEGS1)]. Bundesgesundheitsblatt Gesundheitsforschung

Gesundheitsschutz 2013;56:786-94. [Article in German]
2. Mensink GB, Lampert T, Bergmann E. [Overweight and obesity in Germany 1984-2003]. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 2005;48:1348-56. [Article in German]
3. Guenther D, Schmidl S, Klatte TO, et al. Overweight and obesity in hip and knee arthroplasty: evaluation of 6078 cases. World J Orthop 2015;6:137-44.
4. Pulos N, McGraw MH, Courtney PM, Lee GC. Revision THA in obese patients is associated with high re-operation rates at short-term follow-up. J Arthroplasty 2014; 29:209-13.
5. Belmont PJ Jr, Goodman GP, Hamilton W, et al. Morbidity and mortality in the thirty-day period following total hip arthroplasty: risk factors and incidence. J Arthroplasty 2014;29:2025-30.
6. Friedman RJ, Hess S, Berkowitz SD, Homering M. Complication rates after hip or knee arthroplasty in morbidly obese patients. Clin Orthop Relat Res 2013;471: 3358-66.
7. Raphael IJ, Parmar M, Mehrganpour N, et al. Obesity and operative time in primary total joint arthroplasty. J Knee Surg 2013;26:95-9.
8. Wang JL, Gadinsky NE, Yeager AM, et al. The increased utilization of operating room time in patients with increased BMI during primary total hip arthroplasty. J Arthroplasty 2013;28:680-3.
9. Issa K, Wohl H, Naziri Q, et al. Early results of total hip arthroplasty in the super-obese patients. J Long Term Eff Med Implants 2013;23:309-13.
10. Elson LC, Barr CJ, Chandran SE, et al. Are morbidly obese patients undergoing total hip arthroplasty at an increased risk for component malpositioning? J Arthroplasty 2013;28:41-4.
11. Elkins JM, Daniel M, Pedersen DR, et al. Morbid obesity may increase dislocation in total hip patients: a biomechanical analysis. Clin Orthop Relat Res 2013;471:971-80.
12. Inacio MC, Kritz-Silverstein D, Raman R, et al. The impact of pre-operative weight loss on incidence of surgical site infection and readmission rates after total joint arthroplasty. J Arthroplasty 2014;29:458-64.
13. Dienstknecht T, Luring C, Tingart M, et al. A minimally invasive approach for total hip arthroplasty does not diminish early post-operative outcome in obese patients: a prospective, randomised trial. Int Orthop 2013;37:1013-8.
14. Marconi D, Lee GC. Complications following direct anterior hip procedures: costs to both patients and surgeons. J Arthroplasty 2015;30:98-101.
15. Bennett D, Gibson D, O'Brien S, Beverland DE. Hip arthroplasty in morbidly obese patients - intra-operative and short term outcomes. Hip Int 2010;20:75-80.
16. Wayne N, Stoewe R. Primary total hip arthroplasty: a comparison of the lateral Hardinge approach to an anterior mini-invasive approach. Orthop Rev (Pavia) 2009;1:e27.
17. Weier CA, Jones LC, Hungerford MW. Meralgia paresthetica of the contralateral leg after total hip arthroplasty. Orthopedics 2010;33.
18. Kurtz SM, Ong KL, Lau E, Bozic KJ. Impact of the economic downturn on total joint replacement demand in the United States: updated projections to 2021. J Bone Joint Surg Am 2014;96:624-30.
19. Kurtz SM, Lau E, Ong K, et al. Future young patient demand for primary and revision joint replacement: national projections from 2010 to 2030. Clin Orthop Relat Res 2009;467:2606-12.
20. Kim Y, Morshed S, Joseph T, et al. Clinical impact of obesity on stability following revision total hip arthroplasty. Clin Orthop Relat Res 2006;453:142-6.
21. Maisongrosse P, Lepage B, Cavaignac E, et al. Obesity is no longer a risk factor for dislocation after total hip arthroplasty with a double-mobility cup. Int Orthop 2015;39:1251-8.
22. Dowsey MM, Liew D, Stoney JD, Choong PF. The impact of obesity on weight change and outcomes at 12 months in patients undergoing total hip arthroplasty. Med J Aust 2010;193:17-21.
23. Aranda VP, Navarro-Espigares JL, Hernandez-Torres E, et al. Body mass index as predictor of health-related quality-of-life changes after total hip arthroplasty: a cross-over study. J Arthroplasty 2013;28:666-70.