MENTORS IN ORTHOPEDICS

IS A SHORT STEM AN OPTION FOR OBESE PATIENTS?

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SUMMARY

Background: Obesity is a significant risk factor for hip osteoarthritis due to increased mechanical loading and adipokine-mediated cartilage inflammation. While short-stem femoral components in total hip arthroplasty (THA) offer bone preservation and facilitate minimally invasive approaches, concerns persist regarding their primary stability and potential for increased migration in patients with high body mass index (BMI).

Objective: This study evaluates the clinical and radiological outcomes of a specific short-stem femoral prosthesis in obese patients to determine if increased body weight or BMI adversely affects implant stability and patient satisfaction.

Key Points: Analysis of 483 patients divided by BMI categories (<25, 25–30, and >30 kg/m^2) and 773 patients divided by weight (<100 and >100 kg) revealed no statistically significant differences in implant subsidence or clinical outcomes at 24 months. Although minor initial subsidence (up to 6 mm) occurred within the first three months due to undersizing and learning curve effects, secondary stabilization was achieved in all groups. Obese patients demonstrated higher rates of systemic and wound healing complications, yet reported comparable improvements in Visual Analog Scale (VAS) pain scores. While Harris Hip Scores were slightly lower in the obese cohort (94.4 vs. 97.7), this was attributed to general physical restrictions rather than implant failure. Literature suggests absolute body weight may influence long-term survivorship more than BMI, particularly in patients exceeding 80 kg.

Conclusion: Short-stem femoral components demonstrate comparable stability and clinical efficacy in obese and non-obese populations. Despite higher perioperative risks, obesity is not a contraindication for short-stem THA, provided optimal component sizing and press-fit fixation are achieved.

KEYWORDS

Arthroplasty, Replacement, Hip; Hip Prosthesis; Obesity; Body Mass Index; Prosthesis Failure

INTRODUCTION

Obesity contributes to a higher rate of osteoarthritis in joints not only because of cartilage loading forces but also because the adipose tissue releases adipokine, a protein that leads to excess cartilage inflammation and degradation [11]. Thus the risk to achieve osteoarthritis and to be in need of a total hip arthroplasty (THA) is up to 8.5 times higher than in non-obese patients [1].

The use of short stems in THA has increased over the last 10 years. There is a big variety of short stems that have different philosophies. The benefits described are a more physiological load transfer to the proximal femur and preservation of bone. They enable soft tissue as well as muscle protection and facilitate minimally invasive implantation technique. The smaller implant-bone contact surface may cause inferior primary stability and be associated with higher migration rates compared to traditional stems. Biomechanical studies of the University in Ulm though could show that the stability is comparable to standard stems [2]. The question is if a short stem is suitable also for obese patients.

OUR EXPERIENCE

Weight limits for implants are not often expressed by the manufacturer. Especially with short stems surgeons are skeptic to use them with heavy and obese patients. We took part in a multi-center study in which the stem “optimys” (Figure 1) was used that follows the calcar and slips into the femur easily. 483 patients were divided into 3 groups with body mass index (BMI) <25, 25-30, >30. After 24 months there were no statistically significant differences between these groups respective the implant. As also can be seen in standard implants there were very few subsidences in all three groups up to 6mm during the first three months mainly because the chosen implant was too small partly due to the learning curve with this new implant. Later on during the follow up the implants were stable and no more subsidence was evident (Figure 2).

Figure 1: Optimys short stem (Mathys, Switzerland).

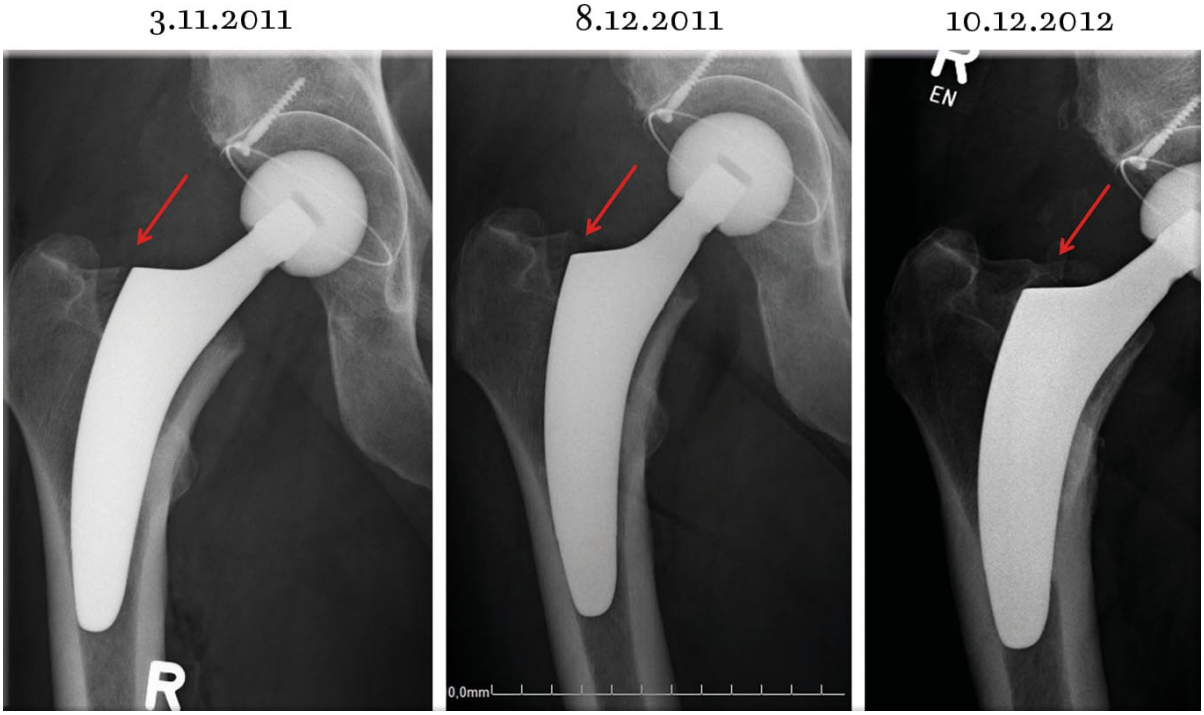

Figure 2: Subsidence obese patient first month, then stable.

Major systemic and wound healing problems were seen more often in the obese patients (Figure 3). But no significant differences were seen between the classes respective the clinical outcome. Pain at rest and under load was measured with the visual analog scale (VAS) (Figure 4).

%	Class 1	Class 2	Class 3
Intraop. complications			
None	95.1	96.6	95.5
Fracture of femur or trochanter	1.4	1.5	1.6
Postop. complications			
Haematoma / seroma	0.7	3.4	3.0
Wound healing disorder	0.0	0.5	0.8
Infection with inlay revision	0.0	0.5	0.8
Aseptic loosening	0.0	0.0	0.8
Mayor systemic compl. (embolism, thrombosis)	0.0	0.0	2.5
Stem revision			
Aseptic loosening	0.0	0.0	0.8
Periprosthetic fracture	0.0	0.5	0.0

Figure 3: Complications in BMI classes.

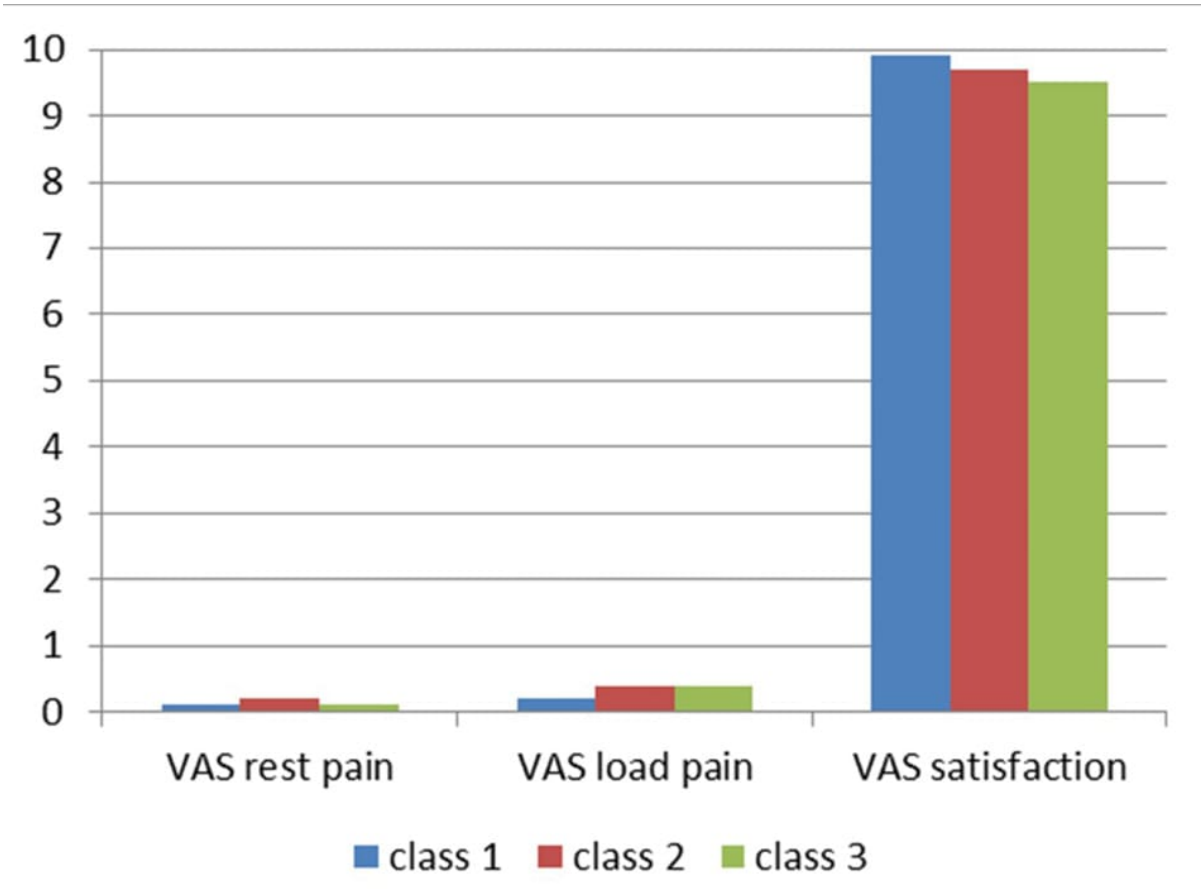

Figure 4: Clinical outcome after 24 months in BMI classes, pain and satisfaction.

The measured difference in the Harris Hip Score is very little and due to the general restrictions by obesity (Figure 5). In another evaluation of this study group we divided 773 patients into weight classes of <100 and >100 kg. Again there were no significant differences to be seen. Pain at rest and under load was measured with the visual analogue scale. The heavy patients complained slightly more and were less satisfied achieving 94.4 points in the Harris Hip Score vs 97.7 points in the lighter group (Figure 6).

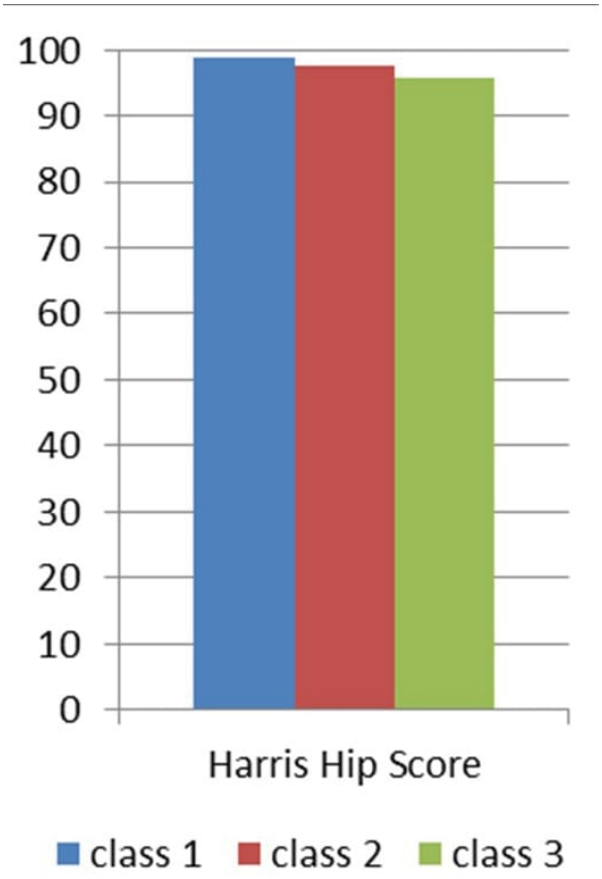

Figure 5: Clinical outcome after 24 months in BMI classes, Harris Hip Score.

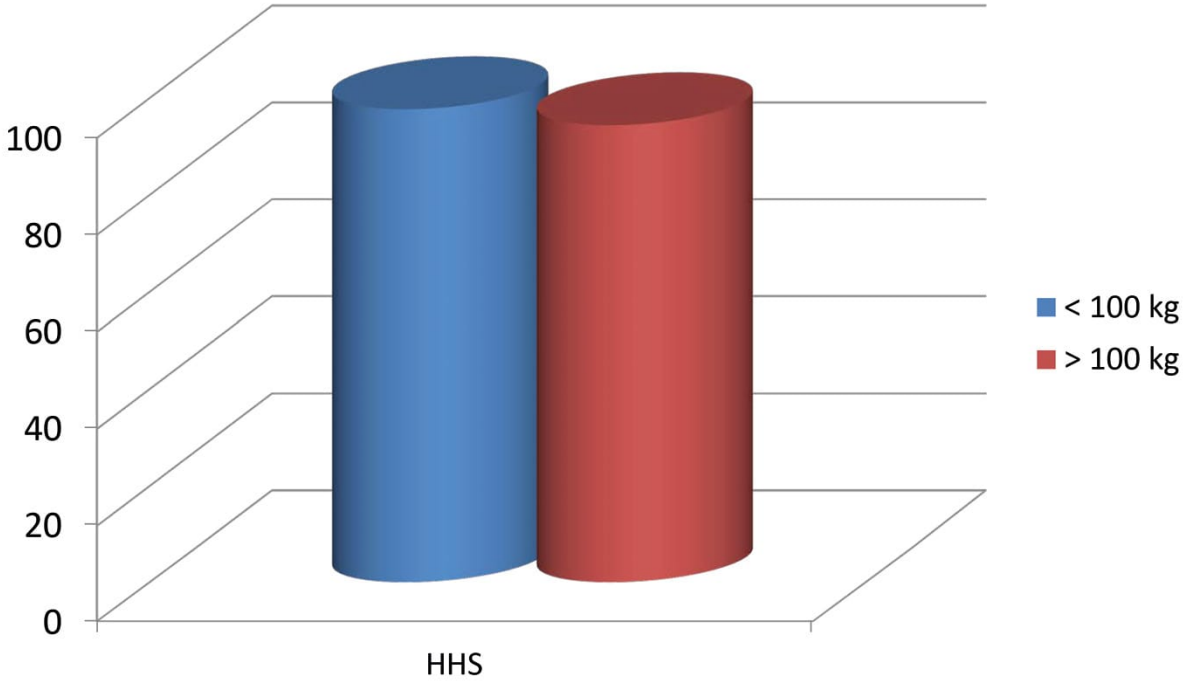

Figure 6: Clinical outcome after 24 months in weight classes, Harris Hip Score.

DISCUSSION

Literature is rare on this topic. A clinical study about the influence on migration patterns of short stems in THA [5] revealed that weight or the size of the femoral stem did not affect the migration of the stems. A study by Freitag et al. [6] of 72 hips in patients with a mean BMI of 29 (21-51) used EBRA technique to measure the subsidence of a short stem. They report subsidence of 1mm (+1.4mm) after 24 months and conclude, that BMI, gender and implant offset did not influence implant migration on a statistical significant level. Nevertheless, a tendency towards more migration in obese and female patients was observed. Stihsen et al. [12] studied subsidence of the stem Vision 2000 respective weight or BMI of the patient. The study demonstrates that BMI does not trigger progressive stem migration whereas weight above 75 kg and height over 165 cm may trigger increased stem migration. The idea is that each kg puts stress onto the implant and may increase the risk of migration. Thus a tall man with normal BMI puts much more stress onto the implant than a small woman with a very high BMI. Advice is given to the surgeon to aim to fit the prosthesis as tight as possible. That weight more than BMI influences survivorship is also the conclusion of Traina et al. [12] especially for men above 80kg. More attention should be given to this aspect in studies and by manufacturers who should test and determine weight limits for their implants. McLaughlin [10] collected data of 285 uncemented Taperloc femoral components after 10-18 years and compared the outcome in obese and non-obese patients. He identified no statistically significant difference with regards to clinical and radiological outcome or complications.

There are quite a few studies that deal with obesity in general and joint arthroplasty. They describe higher complication rates of local inflammations or infections. Gastrointestinal and respiratory tract problems are reported to be higher in morbidly obese patients [7]. A review of literature [1] also points out the increase of risk for local and systemic complications especially because of the comorbidities such as diabetes, obstructive sleep apnea, thromboembolic disease... However there is no significant effect of obesity on the surgery satisfaction and

higher BMI is not associated with worse outcomes of the hip arthroplasty. Milhalko et al. state that “no upper BMI limit has been established beyond which orthopedic surgery is contraindicated, and each patient should be considered individually. Overweight or obese patients should be counseled about the added risks of surgery and offered resources for weight loss before surgery” [9].

CONCLUSION

Our findings and those in literature suggest there is no evidence to withhold THA from obese patients with arthritic hips. The impact of complications and comorbidity is considerable. Of course it is a demanding operation and should be performed by high volume surgeons. Surgery is more difficult and of longer duration with the risk of malpositioning the components [4] especially with minimally invasive techniques. The selected implant needs to have the ideal size and optimal pressfit. In order to prevent dislocation, enough offset and full-cup coverage is needed [3] and on the acetabular side double mobility cups are more effective than big heads to reduce the risk of dislocation [8]. In conclusion short stems seem to perform as well as standard stems. Further long term studies have to prove this statement.

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