

Dual Mobile Total Hip Replacement in Super Obesity: A Case Report and Review of Literature

Anson Albert Macwan¹, Saurav Narayan Nanda¹, Debasish Mishra¹, Sai Akhil Varma Manthena¹, Ankit Gulia¹

Learning Point of the Article:

Dual mobile Total Hip replacement is an efficient implant to prevent post-operative dislocation in morbid and superobese patients. It should be considered as implant of choice at initial Total Hip Replacement.

Abstract

Introduction: More than 13 million people in the US are morbidly obese. It is associated with various medical and anesthetic complications. Higher rate of dislocation in total hip replacement (THR) associated with morbid obesity due to thigh girth, low muscle mass and high-fat content. Morbid obesity is associated with a 38% increase in the 10-year mortality rate compare to non-obese after undergoing primary total hip arthroplasty (THA). Hip dislocation after THR is one of the earliest complications, and for every ten-point increase in BMI, the risk of dislocation increases by 113.9%.

Case Report: We present a case report of a 69-year-old super-obese woman with a BMI of 62.2, who presented with repeated dislocation post THR. The patient was managed successfully with implant removal and implantation of dual mobile THR prosthesis.

Conclusion: Morbid obesity with a need for arthroplasty is challenging. It needs proper planning, thorough preoperative preparation, proper intraoperative care and identification with adequate post-operative complications management. Preoperative bariatric surgery, dual mobile liner and constrained implants have shown good result in decreasing dislocation rate. The liner of dual mobile THR is efficient to prevent post-operative dislocation in morbidly obese and super-obese patients.

Keywords: Dual mobile total hip replacement, super obesity, morbid obesity, bariatric surgery, hip arthroplasty, neck of femur fracture, revision hip arthroplasty.

Introduction

As a sedentary lifestyle is increasing in the 21st century, obesity is becoming worldwide endemic. A large number of patients with obesity are undergoing hip and knee arthroplasty [1]. As per WHO definition, BMI of 20–30 is defined as normal. BMI of 30–40 is considered obese, and BMI of ≥ 40 is considered morbidly obese. In the United States, >34 million people are obese, and >13 million people are morbidly obese [2]. Morbid obese patients are often considered unfit for replacement surgeries because they are likely to develop complications such as dislocation, wound problems, cardiac complications and many

other complications when undergoing major orthopaedic surgeries. In hip and knee arthroplasty surgeries, outcomes are inferior in obese patients compare to non-obese patient [2]. Morbid obesity is associated with an increased rate of dislocation after total hip replacement (THR), and one of the biomechanical proposition is to increase thigh girth causing soft tissue impingement and low muscular support, leading to instability of the joint [3]. There is a high chance of dislocation risk using standard liners in obese patients, while THR with dual mobile liner can significantly reduce the risk postoperatively [4].

Author's Photo Gallery



Dr. Anson Albert Macwan



Dr. Saurav Narayan Nanda



Dr. Debasish Mishra



Dr. Sai Akhil Varma Manthena



Dr. Ankit Gulia

Access this article online

Website:
www.jocr.co.in

DOI:
10.13107/jocr.2021.v11.i10.2486

¹Department of Orthopaedics, Kalinga Institute of Medical Science, Kalinga Institute of Industrial Technology, Bhubaneswar, Odisha, India.

Address of Correspondence:

Dr. Anson Albert Macwan,
Department of Orthopaedics, Kalinga Institute of Medical Science, Kalinga Institute of Industrial Technology, Bhubaneswar, Odisha, India.
E-mail: ansonmac89@gmail.com

Submitted: 26/06/2021; Review: 30/08/2021; Accepted: September 2021; Published: October 2021

DOI:10.13107/jocr.2021.v11.i10.2486

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License <https://creativecommons.org/licenses/by-nc-sa/4.0/>, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms

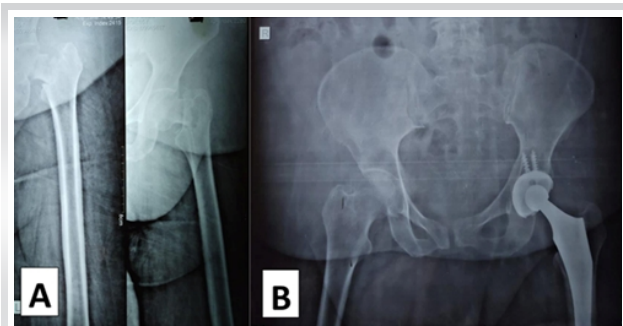


Figure 1: (a) Initial fracture neck of femur left (b) Surgically treated with Total Hip replacement.

Case Report

A 69-year-old female with a weight of 140 kg and BMI of 62.2 presented to us after twist and fall bathroom associated with left hip pain and inability to bear weight without any neurological deficit. She was operated on 1 year back for total hip arthroplasty (THA) for fracture neck of femur in the same hip (Fig. 1a, b).

X-ray pelvis with both hips was done, showing left prosthetic hip dislocation (Fig. 2a, b). CT scan was done to confirm the posterior dislocation of the hip (Fig. 3a, b, c, d). The version acetabular side and femoral side were found to be 15.6° and 17.8°, respectively. The anteversion of the acetabular cup was found to be 56°. The hip reduction was done under GA (Fig. 2a, b). The patient presented again 1 month later with the same dislocation. The patient was planned for implant exit from the acetabular side and revision dual mobile cup prosthesis implantation. On further investigation, we found the presence of deep vein thrombosis (DVT) in the patient. Preoperative DVT prophylaxis was taken as per cardiology consultation, and inferior vena cava filter was used.

The standard OT table was insufficient for the patient, and two OT tables are joined together to provide a safe positioning of the

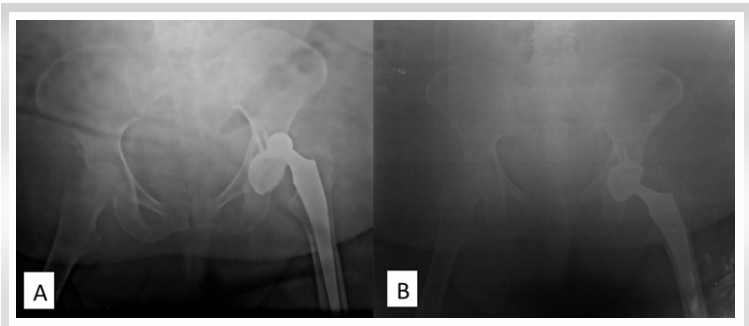


Figure 2: (a) X-ray showing peri-prosthetic dislocation (b) X-ray showing contained implant after closed reduction.

patient (Fig. 4a). Before starting the procedure, an attempt was taken to reduce the hip joint. The joint was found to get reduced but was unstable and can be dislocated with minimal internal rotation. In lateral decubitus position through the posterior approach, a 10–15 cm curved incision was given posterior to greater trochanter over old scar mark. Superficial dissection was done by incising fascia lata and gluteus maximus. Deep dissection was done by detaching short external rotators and opening the capsule and fibrous tissue. The prosthesis was dislocated, and the head was detached from the femoral stem. The poly liner was removed. The acetabular shell was found to have a solid fixation, and we could not extract it using the standard attachment. The cup extractor system was used to cut the bone prosthesis interface with ease (Fig. 4b). The extracted cup size was 46 mm. further reaming was done up to 48 mm, and an acetabular cup of 48 mm was implanted after the trial implant [5] (Fig. 4c). Efforts were made to achieve an approximate 45° inclination and 15° anteversion. The acetabular shell was stabilized with three 6.5 mm cancellous screws to the ilium. The femoral head components were assembled with a 22 mm head size (Fig. 5a, b, c, d, e) Intra-operatively the joint was found to be stable. The wound was closed in layers keeping a negative suction

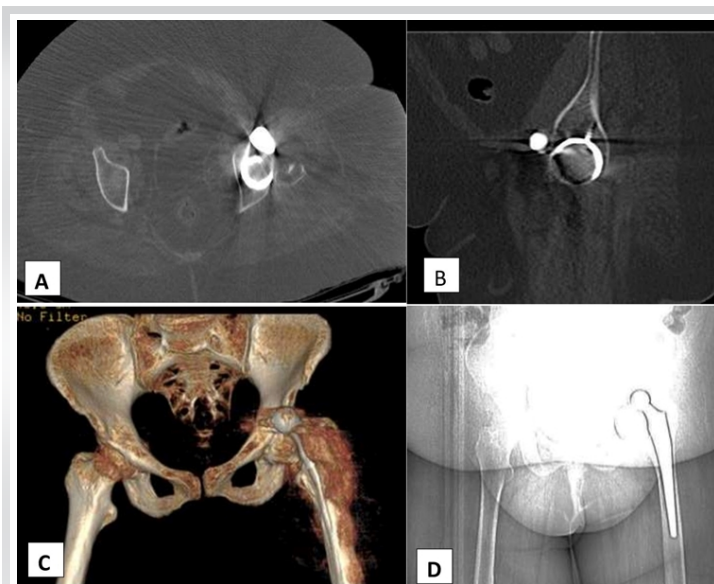


Figure 3: CT images showing left prosthetic dislocation (a) Axial section, (b) Saggital section, (c) 3D reconstruction, (d) Coronal view.

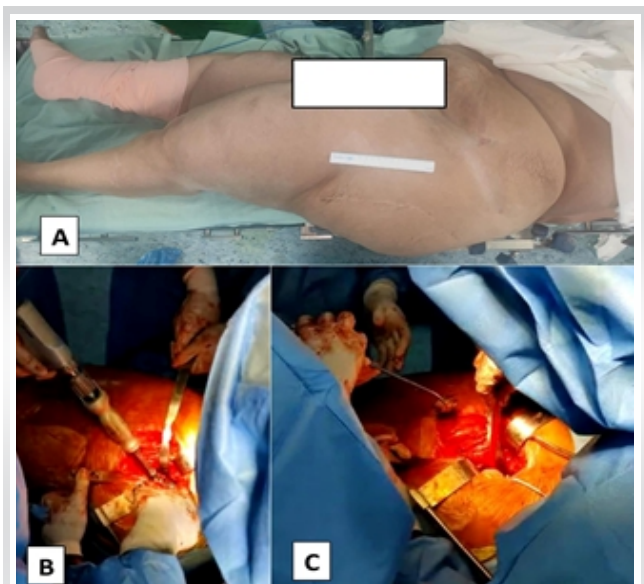


Figure 4: (a) Positioning of the patient, (b) Removal of acetabular shell with an extractor, (c) Acetabular cup implantation.

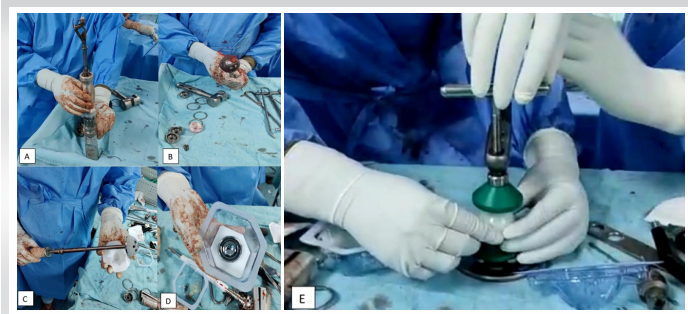


Figure 5: (a) Acetabular Cup extractor, (b) Old acetabular shell, (c) New acetabular shell, (d) Dual mobile cup, (e) Femoral head assembly preparation with metal on polyethylene.

drain.

The drain was kept for 48 h post-surgery and was removed with a minimal collection. But there was continuous soakage from the surgical wound site and was continue up to post-operative day 6. It was managed with a single-use negative pressure wound therapy device (Fig. 6). The soakage was controlled, and the patient was discharged on post-operative day 15. The patient was mobilized with assistance from post-operative day 1 with the walker (Fig. 7, 8) Patient can move independently with a walker after 1 month from the date of surgery. She could able to walk unassisted after 3 months from the date of surgery. The patient was followed up for 1 year, and there were no reported complications (Fig. 9).

Discussion

According to recent studies, more than 1.9 billion adults are overweight, while 650 million people are obese. It is estimated that more than 135 million people are affected by obesity in India. The prevalence is higher in the urban population and high socioeconomic status [6].

BMI is the most commonly used measurement in classifying obesity [7] (Table 1).

Bourne et al. have reported from a large cohort study done on 54,406 subjects that BMI >40 kg/m² is associated with a 8.56 fold higher risk of undergoing hip arthroplasty due to hip arthritis [8]. Venous thromboembolism and pulmonary embolism are severe complications after total joint arthroplasty. Although the literature suggests a higher chance of complications with obesity, there is no significant difference in

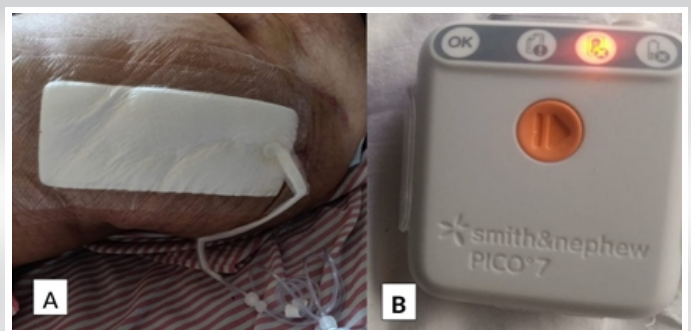


Figure 6: Single use negative pressure wound therapy device.

obese patients compared to non-obese patients [9]. Hip dislocation after THR is one of the earliest complications. With every ten-point increase in BMI, the risk of dislocation increases by 113.9%. The postulated cause of the dislocation is that BMI more than 40 kg/m², the circumference of the thigh is increased, which puts lateral force on the prosthesis and causes the dislocation. This complication can be reduced by decreasing the abduction angle and high offset neck. Increasing head size has shown not to be helpful in these cases [9]. Elkins et al. did a biomechanical study and showed no benefit in using a 36 mm head compared to a 28 mm head. 28 mm head provides full 180° head coverage compared to 36 mm, which is 163 degree. It is easier for a 36 mm head to slide out due to the rounded chamfer. 8 mm neck offset has also shown to increase stability by increasing periarticular soft tissue tension and ROM before implanting the implant. They have suggested that dislocation depends on the cup shape and geometry rather than size [3].

Revision surgery in a morbidly obese patient after THA is higher. As the BMI of the patient increases, there is associated higher wear, lesser survivorship and increased implant failure due to aseptic loosening. BMI higher than 30, aseptic failure for revision is higher, around 56% in obese compare to 12% in non-obese. In super obese patient, a BMI of more than 50 is associated with poor survivorship of the implant [9]. In a systemic review of 66000 THA in morbidly obese patient and 700,000 non-obese patients, the revision rate was around 8% in the morbidly obese group compared to 2.75% in non-obese patients [10]. Prosthetic joint infection is one of the worrisome complications in the morbidly obese patient after THR surgery. BMI >40 is a significant risk factor for deep prosthetic infection, and the



Figure 7: Post-operative mobilization. (a) Bedside physiotherapy, (b) Patient able to stand from chair, (c) Patient able to walk with walker.

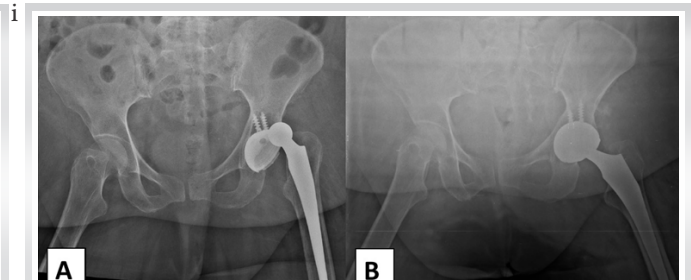


Figure 8: (a) Pre-operative X-ray showing periprosthetic dislocation, (b) Post-operative X-ray showing dual mobile prosthesis.



Figure 9: One year follow-up. (a) A-Patient able to seat without support, (b) Patient able to stand without support, (c) Walk with help of walker.

incidence is lower than total knee arthroplasty [9].

Various factors to be considered preoperatively in a morbidly obese patient. They often have multiple medical comorbidities, which has a significant impact on the outcome of the surgery. Furthermore, there are anesthetic risk factors associated. Diabetes mellitus, obstructive sleep apnea and cardiopulmonary diseases are usually associated with obesity and can significantly increase the overall complication rate [11]. Bariatric surgery is one of the popular treatments of choice for decreasing obesity in a patient undergoing THR. It has shown to be a decrease rate of dislocation compare to continue with the same weight. However, higher rate of dislocation was observed if a standard cup with a simple liner was used without bariatric surgery before THR [4, 5].

Dual mobile and constrained implants are helpful to prevent dislocation and to treat repeated dislocation. The shape and functionality of the dual mobile liner creates a large diameter articulation and covers the femoral head when the thigh comes in contact. Constraint liner prevents dislocation by retention mechanism, which prevents translation of femoral head with thigh impingement [4]. Hernigou et al. studied revision THR in 32 obese patients using standard cups with 32 mm head and 35 obese patients with dual mobile with 28 mm head. They reported dislocation in five patients in standard cups and 0 patient to compare to dual mobile cup on 1 year follow-up, seven patients in the standard group and one patient in the dual mobile group on 5 years follow-up. Hence, dual mobility liners are an efficient technique to prevent post-operative dislocation in the morbidly obese patient [12].

Various post-operative complications are associated with THA in super obese (BMI>50) patient. The most common complication associated is superficial wound infection, prolonged wound drainage or erythema. Other associated complications are aseptic loosening, sciatic nerve injury,

Table 1: Table defining obesity

Defining obesity	BMI(kg/m ²)
WHO	
Normal	19.5–24.9
Overweight	25–29.9
Obesity	>=30
Accepted definitions	
Morbid obese	>=40
Super obese	>=50
Classification if obesity	
Class I	30–34.9
Class II	35–39.9
Class III	>=40

dislocation, deep surgical infection, and periprosthetic fractures. Super obese patients are associated with a six-fold increase in complications and a threefold increase in severe complications [13]. Our patient developed post-operative wound discharge and was managed with a single-use negative pressure wound therapy device. The device aims to reduce the post-operative infection, the opportunity for the patient to be managed at home, and decreased hospital cost with improved recovery. The PICO NPWT system is a portable, ultra-lightweight, very practical option for ambulatory patients [14].

Revision THR compares to primary THR is associated with more soft tissue damage, increases operating time, and risks the incidence of superficial and deep infection. There is a higher dislocation rate after revision due to a greater extent of soft tissue damage and further muscle weakness [15]. Morbid obesity is associated with a 38% increase in the 10-year mortality rate compare to non-obese after undergoing primary THA [16]. They present various challenges starting from medical comorbidities, anesthesia fitness and implant of choice to post-operative complications. The case was presented to us with a dislocated THR, a known complication in the morbidly obese patient after THR. She would have been managed with dual mobile THR prosthesis and constrained implants. It is difficult to re-operate in such cases due to morbidities, surgical and anesthetic challenges. Our case report will guide physicians to plan and manage morbidly obese patients by choosing the right implants and achieving good outcomes with fewer complications.

Conclusion

Morbid obesity is increasing worldwide with increasing sedentary lifestyle and increased urbanization. Obesity itself is associated with many morbidities and medical complications.

When it presents with a need for arthroplasty, it becomes more challenging. Arthroplasty surgery in obese patients needs proper planning, thorough preoperative preparation, proper intraoperative care and identification with adequate post-operative complications management. Options of preoperative bariatric surgery, dual mobile prosthesis and constrained implants can help in decreasing the risk of hip dislocation in the early post-operative period. One can achieve good surgical and

functional outcomes in such morbid obese patients by taking appropriate measures.

Clinical Message

Dual mobile total hip replacement should be considered in morbid obese patient as primary implant choice for primary hip arthroplasty.

Declaration of patient consent : The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient's parents have given their consent for patient images and other clinical information to be reported in the journal. The patient's parents understand that his names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

1. Namba RS, Paxton L, Fithian DC, Stone ML. Obesity and perioperative morbidity in total hip and total knee arthroplasty patients. *J Arthroplasty* 2005;20 Suppl 3:46-50.
2. Parvizi J, Trousdale RT, Sarr MG. Total joint arthroplasty in patients surgically treated for morbid obesity. *J Arthroplasty* 2000;15:1003-8.
3. Elkins JM, Daniel M, Pedersen DR, Singh B, Yack HJ, Callaghan JJ, et al. Morbid obesity may increase dislocation in total hip patients: A biomechanical analysis. *Clin Orthop Relat Res* 2013;471:971-80.
4. Hernigou P, Trousselier M, Roubineau F, Bouthors C, Flouzat Lachaniette CH. Dual-mobility or constrained liners are more effective than preoperative bariatric surgery in prevention of THA dislocation. *Clin Orthop Relat Res* 2016;474:2202-10.
5. Buchwald H, Avidor Y, Braunwald E, Jensen MD, Pories W, Fahrback K, et al. Bariatric surgery: A systematic review and meta-analysis. *JAMA* 2004;292:1724-37.
6. Ahirwar R, Mondal PR. Prevalence of obesity in India: A systematic review. *Diabetes Metab Syndr* 2019;13:318-21.
7. Mihalko WM, Bergin PF, Kelly FB, Canale ST. Obesity, orthopaedics, and outcomes. *J Am Acad Orthop Surg* 2014;22:683-90.
8. Bourne R, Mukhi S, Zhu N, Keresteci M, Marin M. Role of obesity on the risk for total hip or knee arthroplasty. *Clin Orthop Relat Res* 2007;465:185-8.
9. Bookman JS, Schwarzkopf R, Rathod P, Iorio R, Deshmukh AJ. Obesity: The modifiable risk factor in total joint arthroplasty. *Orthop Clin North Am* 2018;49:291-6.
10. Barrett M, Prasad A, Boyce L, Dawson-Bowling S, Achan P, Millington S, et al. Total hip arthroplasty outcomes in morbidly obese patients: A systematic review. *EFORT Open Rev* 2018;3:507-12.
11. Martin JR, Jennings JM, Dennis DA. Morbid obesity and total knee arthroplasty: A growing problem. *J Am Acad Orthop Surg* 2017;25:188-94.
12. Hernigou P, Auregan JC, Potage D, Roubineau F, Flouzat Lachaniette CH, et al. Dual-mobility implants prevent hip dislocation following hip revision in obese patients. *Int Orthop* 2017;41:469-73.
13. Arsoy D, Woodcock JA, Lewallen DG, Trousdale RT. Outcomes and complications following total hip arthroplasty in the super-obese patient, BMI>50. *J Arthroplasty* 2014;29:1899-905.
14. Payne C, Edwards D. Application of the single use negative pressure wound therapy device (PICO) on a heterogeneous group of surgical and traumatic wounds. *Eplasty* 2014;14:e20.
15. Lübbeke A, Moons KG, Garavaglia G, Hoffmeyer P. Outcomes of obese and nonobese patients undergoing revision total hip arthroplasty. *Arthritis Rheum* 2008;59:738-45.
16. Tohidi M, Brogly SB, Lajkosz K, Harrison MM, Campbell AR, van DenKerkhof E, et al. Ten-year risk of complication and mortality after total hip arthroplasty in morbidly obese patients: A population study. *Can J Surg* 2019;62:442-9.

Conflict of Interest: Nil
Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

How to Cite this Article

Macwan AA, Nanda SN, Mishra D, Gulia A, Varma Manthena S A. Dual Mobile Total Hip Replacement in Super Obesity: A Case Report and Review of Literature. *Journal of Orthopaedic Case Reports* 2021 October;11(10): 91-95.

