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Total hip arthroplasty

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Abstract
Primary total hip arthroplasty has become one of the most successful surgical procedures over the past 50 years and is currently performed worldwide with similar techniques and excellent results. Despite variations in technique and implant selection, medium and long term outcome studies have demonstrated over 90% implant survival at 15 to 25 years. Previous problems with implant fixation have now been reduced, and the focus has shifted to the selection of improved bearing surfaces to limit wear, hip replacement options for younger patients, and improved surgical and anesthetic techniques. Current surgical approaches to the hip rely most often on direct lateral or posterolateral exposure. The most commonly utilized bearing surface for both hip replacement and hip resurfacing in Canada is a metal (cobalt-chrome) femoral head combined with a second-generation cross-linked polyethylene, combined with cementless implant fixation. Alternative bearings such as ceramic-on-ceramic and metal-on-metal may be considered for hip replacement in younger patients. Although it has not been determined which surface will prove best for younger patients in the long term, there is no question about the benefits of total hip arthroplasty. With current techniques, the results are favorable, and patient satisfaction, pain relief, and long-term implant survival are excellent.

Keywords: Dual mobility cups (DMCs), THA (Total hip Arthroplasty), dislocation, elderly patients

Introduction
Hip is one of the largest weight bearing joints in our body. It consists of two parts namely, a ball (femoral head) at the top of our thighbone (femur) and it fits into a rounded socket (acetabulum) in our pelvis. A band of tissues called ligaments connect the ball to the socket and provide stability to the joint. The hip joint may get damaged due to diseases like rheumatoid arthritis, osteoarthritis, fractures, and dislocations and sometimes due to accidents too. This may cause the fracture of hip and will give the permanent handicapping to the person. There are several types of hip fractures, like: Femoral neck fracture: Pins (surgical screws) are used if the person is younger and more active, and if the broken bone is not removed much out of place. If the person is older and less active, a high strength metal device that fits into hip socket, replacing the head of the femur (hemiarthroplasty) is needed. Intertrochanteric fracture: A metallic device (compression screw and side plate) holds the broken bone in place while it lets the head of the femur move normally in the hip socket. The Total Hip Replacement is the latest technology, which has been implemented as a boon for the humanity. By the implementation of the total hip replacement, the person who is facing the problem in the hip injury or meet with an accident will get benefited and it will enable the person to regain to normal work.

Materials and Methods
This retrospective, single-center study was performed on a series of 50 patients treated with THA in a 2 year period (January 2017–December 2018). Half of the patients underwent THA with an uncemented standard unipolar cup, while an uncemented DMC was used in the remaining 25 patients (DMC group). A cemented femoral stem was used in all patients. In the SC group, a 32 mm metallic femoral head was used, while DMCs were coupled with a 28 mm ceramic head. Preoperative planning was performed on digital radiograms of the contralateral hip was used. All the procedures were performed through a postero-lateral approach, with reattachment of the short external rotators. A double administration of vancomycin was used for antibiotic prophylaxis: 1 g preoperatively and 0.5 g 12 h after surgery.

In-hospital rehabilitation was started the first day after surgery and patients were mobilized out of bed on day 2 for gait re-education with a walking frame. After discharge from the hospital, patients were evaluated clinically and radiographically at 1, 3, 6 and 12 months after surgery. At the last follow up, the WOMAC osteoarthritis index was recorded. Acetabular osteointegration was analyzed on X-rays using the Moore criteria: the presence of the three most sensitive signs (absence of radiolucent lines, presence of supero- lateral buttress and presence of medial stress-shielding) defined the cup as "osteointegrated". The scores were compared with the use of a paired Student's t-test for parametric data and with the use of Wilcoxon–Mann–Whitney test for non parametric data. The significant cut-off for the p-value was set to 0.05. We compared the two groups for demographic data, comorbidities, length of stay from surgery to discharge, dislocation and infection rate, osteointegration, heterotopic ossification and WOMAC score. We also investigated correlations between WOMAC and each variable in both groups and in the total population of the study.

Results

At an average follow up of 18 months (range, 12 to 24), 46 patients were evaluated with the WOMAC score. 2 patients (1 in each group) died for reasons not related to surgery before the last follow up: no postoperative complications were recorded among these patients, who were eventually excluded for further analyses. Thus, 24 patients for each group were included in the study and fully assessed. Demographic and relevant clinical data of the patients are reported in the study. The two groups of patients were comparable for age and gender. The analysis of comorbidities revealed a statistically significant prevalence of neurologic comorbidities and psychiatric disorder in DMC group. SD ± 3.19) for the SC group; the difference was not statistically significant (p-value =0.64). No dislocation occurred in the DMC group, while two dislocations were observed in the SC group. Both dislocations occurred during the first month after surgery: one in a male patient following an accidental fall and one in a female patient without any traumatic event. The first patient was treated with closed reduction and THA dislocation never recurred. The female patient suffered of postoperative moderate-grade delirium with poor cooperation in the rehabilitation program, dislocation occurred twice in the rehabilitation institute. In consideration of her mental state and poor compliance, she underwent a revision procedure: the femoral stem and acetabular cup were retained, the liner and the head were substituted and a neck adapter, was implanted to increase length and lateral offset in order to enhance implant stability. Dislocation did not recur and at follow up the patient reported complete recovery of autonomy and preoperative activities.

Table 1: Demographic and relevant clinical data of the study population

	DMC Group $n = 24$	SC Group $n = 24$	p-Value
Age	77.03	78.35	0.41
Gender (M:F)	7:21	7:21	1.00
Neurological comorbidities [(1)]	12	4	0.03 *
Diabetes	0	3	0.23
Obesity	5	2	0.41
Rheumatological diseases	2	2	0.99
Psychiatric disorders [(2)]	6	0	0.02 *

[(1)] Parkinson's disease $n = 3/1$; Hemiplegia n = 1/0; Hemiparesis $n = 8/3$. [(2)] Anxiety-depressive disorder $n = 6/0$. (*) statistically significant p-values.

Table 2: Correlation between the WOMAC score and clinical-radiographic variables at follow up

	Yes/No	Mean WOMAC	p-Value
Neurological comorbidities	y 14 n 34	1.48 8.23	0.04 *
Diabetes	y 3 n 45	17.0 5.55	0.04 *
Obesity	y 7 n 41	1.56 7.06	0.23
Rheumatological diseases	y 4 n 44	1.25 6.72	0.32
Psychiatric disorders	y 6 n 42	0.00 7.16	0.02 *
Dislocation	y 2 n 46	6.47 1.5	0.80
Osteointegration	y 37 n 7	4.96 15.5	0.16
Heterotopic ossifications	y 7 n 41	6.70 6.19	0.22

WOMAC scores resulted to be significantly better in the presence of neurological comorbidities, in the absence of diabetes and in the case of psychiatric disorders. No statistical correlation could be found inside each group and in the comparison between the two groups because the sample size was too small. Better WOMAC scores, but without statistical significance, were found in the case of osteointegrated cups (p-value = 0.16). (*) statistically significant p-values.

No other complications, such as infections or mechanical failures, were observed in this series of patients. At follow up, the mean WOMAC score for all patients was 6.26 (range, 0–46). The score in the DMC group was better (lower) than in the SC group: 4.94 (SD ± 9.12) vs. 7.58 (SD ± 12.5). However, the difference was not statistically significant (p-value = 0.41). Radiographic signs of acetabular osteointegration at 1 year (Figure 2) were found in 42 patients

(87.5%): 20 in the DMC group (83.3%) and 22 in the SC group (91.6%), with a non-significant difference (p-value = 0.98). No cases of implant mobilization were detected on X-rays. Heterotopic ossifications had a similar incidence in the two groups: four in the DMC group and three in the SC group (p-value = 0.99).

Discussion

The dual mobility concept was developed by Bousquet 50 years ago to decrease the risk of THA dislocation. In standard THA, it was demonstrated that head sizes larger than 36 mm increase the head/neck ratio and the "jumping" distance. Consequently, impingement between neck and the liner rim is reduced and hip stability is increased The presence of two distinct articulations in the DMC combines Charnley's principle of low friction arthroplasty with the McKee–Farrar concept of larger femoral heads to enhance stability: primary movement occurs at the inner bearing, while the outer bearing only moves at the extreme ranges of movement. Owing to these features, the use of DMCs for the treatment of FNF has increased exponentially in the last decade. Radiographic examination did not reveal any complication at 1-year follow up, with a rate of 87.5% (42/48) osteointegrated cups in the total population. The SC group showed a higher number of osteointergrated cups than DMC (22 vs. 20), but this difference was not significant. It must be noted that the DMCs used in our series did not allow for the insertion of screws to increase primary stability of the acetabular cup. This is a drawback in patients with compromised bone quality and might require cement fixation. In a recent study, Sunilkumar *et al*. highlighted the risk of improper cup fixation and periprosthetic acetabular fractures with the use of DMCs for FNF in elderly patients. The lack of screws for fixation and the inability to visualize the acetabular floor during impaction were considered disadvantages of this implant, particularly in presence of osteoporotic bones.

Conclusion

In the past decades, concerns have been raised for the long-term survival of first-generation DMCs, since the additional bearing surface could accelerate polyethylene wear and increase the risk of aseptic loosening. However, recent register studies comparing DMC and conventional THA have ruled out these concerns, reporting no differences in revision rates for loosening with newer implants. Despite that our study was limited by a small sample size, according to our experience and to the most recent literature on the topic, we conclude that DMC THA presents short- term outcomes comparable to conventional THA. The use of DMCs for the treatment of displaced FNF in older patients is a reasonable choice, since it allows for a decrease in the risk of postoperative dislocations and improves the prognosis of these frail and often non-cooperative subjects.

References

1. Bloemheuvel EM, Van Steenbergen, LN Swierstra BA. Low revision rate of dual mobility cups after arthroplasty for acute hip fractures: Report of 11,857 hip fractures in the Dutch Arthroplasty Register (2007–2019). Acta Orthop. 2021;92:36-39.
2. Jobory A, Kärrholm J, Overgaard S, Becic Pedersen A, Hallan G, Gjertsen JE, *et al*. Reduced Revision Risk for Dual-Mobility Cup in Total Hip Replacement Due to Hip Fracture: A Matched-Pair Analysis of 9040 Cases from the Nordic Arthroplasty Register Association (NARA). J. Bone Jt. Surg. 2019;101:1278-1285. [CrossRef] [PubMed]
3. Smith TO, Cooper A, Peryer G, Griffiths R, Fox C, Cross J. Factors predicting incidence of post-operative delirium in older people following hip fracture surgery: A systematic review and meta-analysis. Int. J. Geriatr. Psychiatry. 2017;32:386-396. [CrossRef]
4. You D, Sepehri A, Kooner S, Krzyzaniak H, Johal H, Duffy P, *et al*. Outcomes of total hip arthroplasty using dual mobility components in patients with a femoral neck fracture. Bone Jt. J. 2020;102:811-821. [CrossRef]
5. Romagnoli M, Grassi A, Costa GG, Lazaro LE, Lo Presti M, Zaffagnini S. The efficacy of dual-mobility cup in preventing dislocation after total hip arthroplasty: A systematic review and meta-analysis of comparative studies. Int. Orthop. 2019;43:1071-1082. [CrossRef]
6. Burgers PT, Van Geene AR, Van den Bekerom MP, Van Lieshout EM, Blom B, Aleem IS, Bhandari M, Poolman RW. Total hip arthroplasty versus hemiarthroplasty for displaced femoral neck fractures in the healthy elderly: A metaanalysis and systematic review of randomized trials. Int. Orthop. 2012;36:1549-1560. [CrossRef]
7. Lewis PM, Waddell JP. When is the ideal time to operate on a patient with a fracture of the hip? Bone Jt. J. 2016;98:1573-1581.[CrossRef]
8. Marais LC, Ferreira N. Management of femoral neck fractures. SA Orthop. J. 2013;42:3.
9. Hoskins W, Webb D, Bingham R, Pirpiris M, Griffin XL. Evidence based management of intracapsular neck of femur fractures. HIP Int. 2017;27:415-424. [CrossRef] [PubMed]
10. Johansson T, Jacobsson SA, Ivarsson I, Knutsson A, Wahlström O. Internal fixation versus total hip arthroplasty in the treatment of displaced femoral neck fractures: A prospective randomized study of 100 hips. Acta Orthop. Scand. 2000;71:597-602. [CrossRef] [PubMed]
11. Homma Y, Baba T, Ozaki Y, Watari T, Kobayashi H, Ochi H, Matsumoto M, Kaneko K. In total hip arthroplasty via the direct anterior approach, a dual-mobility cup prevents dislocation as effectively in hip fractures as in osteoarthritis. Int. Orthop. 2017;41:491-497. [CrossRef