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Mid-term results of total hip Arthroplasty with dual-mobility in a country with low-income: A review of 58 cases

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Abstract

Objectives: The aims of this work were to assess functional and radiographic results of primary total hip arthroplasty and to determine the profile of patients and the different indications.

Materials and Methods: We conducted a retrospective study of 56 patients operated for total hip arthroplasty at Afagnan hospital (Togo), from first January 2007 to 31 December 2016. The clinical evaluation was made with Devane activity score and Postel Merle D'Aubigné (PMA) score. Radiologically, the analysis focused on the inclination of the cup, and the osseointegration of implants.

Results: 56 patients underwent total hip arthroplasty with dual-mobility cups in which two bilateral. The average passing time of follow-up was 6, 5 years [range 1-9 yrs.]. The mean age was 42.69 years (20-77). The main indications were: aseptic osteonecrosis of hip 28 cases (48.27%), sequelae of trauma 11 cases (18.96%), hip dysplasia 4 cases (06.90%), and primitive degenerative arthritis 12 cases (20.69%). The PMA score increased from 9.1 (2-15) preoperatively to 15.8 (13-18) at the last follow. The average of the inclination cups was 42 degrees. No episode of luxation was watched for the arthroplasty with dual-mobility cup. The survival rate was 100%.

Conclusion: Total hip arthroplasty were mainly impacted with a dual-mobility cup at the last follow; the overall results are satisfactory with PMA score of 15.8. Our study confirms the medium-term reliability of dual -mobility cup with 100% survival rate. These results must be tempered because of the occurrence of long-term complications related to the risk of dual mobility among young people.

Keywords: total hip arthroplasty; dual-mobility cup result; togo

1. Introduction

In the industrialised countries, the total hip arthroplasty (THA) became an orthopaedic operation of routine ^[1]. It procures in an undeniable way a relief of the pains and an improvement of the function while respecting the specifications biomechanics with outcomes in terms of survival of the implants higher than 95% to 10 years ^[2]. If in Africa, works were published in this domain ^[3, 4], in Togo we observe an increasing evolution of the procedures of THA for these last five years. We present the outcomes of a monocentric and continuous retrospective study of 56 patients treated by a THA with dual- mobility cups. Thus, the objective of this study was to evaluate the clinical and radiographic outcomes and to specify the indications.

2. Patients and methods

2.1 Patients and Materials

We retrospectively analysed a monocentric continuous series and mono-operator of 56 patients operated between January 1st, 2007 and December 31st, 2016 of a total hip replacement (THR) with dual-mobility. They were 26 women (27 hips) and 30 men (31 hips). The average age was 42.69 years [range 20-77yrs]. The average Body Mass Index (BMI) was of 28.45kg/m² (18-33), six (10.34 percent) patient had a BMI upper to 30 (moderate obesity).

The characteristics of the series are summarized in Table 1.

Table 1: Characteristics of series

Items	Value
Number of the patients	56
Number of THA	58
Male	30 (31THA)
Women	26 (27THA)
Age	42,69 (20-77)
BMI	28,45 kg/m ² (18-33)
BMI > 30	6 (10, 34%)
Secondary degenerative arthritis	46 (79, 31)
Avascular necrosis of Head (sickle cell anemia)	28 (48, 27%)
Posttraumatic	11
Dysplasia of hip grade 1, 2	4
Sequelae of chronic osteomyelitis	3
Primitive degenerative arthritis	12 (20, 65)
Score of activity of Devane	grade 1 :1 ; grade 2 :1

*BMI: Body mass index

The criteria of inclusion were: Primary THA with dual-mobility or not, patients operated for an essential or secondary degenerative osteoarthritis (dysplasia stage 1 and 2 of Crowe or avascular necrosis of femoral head). Were excluded from

our study: the major morphologic abnormalities, developmental dysplasia, and sequelae of chronic osteomyelitis (Figure1).



Fig 1: (A) the major morphologic abnormalities; (B) sequelae of chronic osteomyelitis; (C) developmental dysplasia of the hip

The hospital was supplied in implants with dual-mobility from Biomet by only one supplier.

54 patients were judged as active and two others as underactive according to Devance *et al.* [5]. According to Chanrley [6], 52 (93.10 percent) were classified Chanrley A including 28 sickle cell anemia; two (3.45 percent) Chanrley B with a bilateral attack and two others (3.45 percent) Chanrley C; they were one chronic dialysed and one hemiplegic. We didn't do a pre and postoperative CT scan. All the interventions were carried out by the same senior operator. The size of the implants was preoperative planning including the use of plastic overlay templates. The hip prosthesis were implanted by a Moore posterolateral approach, except two patients for which Hardinge direct lateral transgluteal approach was used. The acetabulum was reamed until subchondral bone bleeding. The diameter of the cups varied from 48 to 54 mm. Complementary gestures were realized either for the reconstruction of the acetabulum's roof or for the filling of the acetabulum's bottom respectively by cancellous grafts or grafts coming from the femoral head (Figure 2).



Fig 2: Protrusio deformity: Total hip replacement after acetabulum reconstruction using autogenous bone graft from femoral head

The preparation of the femur was done by successive reamers until having a cortical contact into lateral and internal. The characteristics of the implants used and the incidents perioperative were indexed in Table 2.

Table 2: Characteristics of implants

Implants	Number	Percentage (%)
Cimentless Cup Aura II	45	77,58
Cimentless Cup Twin cup	13	22,42,
Head size		
22,2 mm	05	08,62
28 mm	53	91,38
32 mm	00	00
Neck length		
short	11	18,97
Medium	45	77,58
Long	02	03,45
Couple of friction		
(metal on polyethylene)	58	100
Type of scellement		
Press-fit	46	79,31
Cimented	12	20,69

The postoperative protocol included a sitting in the use of the armchair at Day 2nd, and the resumption of walk with support if the primary stabilization were obtained. The prophylactic anticoagulation was for six weeks.

2.3 Method of the followup of the patients

The patients were re-examined at 6 weeks, 3 months and 1 year, and then according to the evolution. They have been evaluated clinically and radiologically into preoperative and postoperative. The function was evaluated with the Postel Merle d'Aubigne score [7] and the score of activity of Devane *et al.* [5]. The subjective clinical assessment was based on a quiz of global satisfaction, classified in: excellent, good, fair

and poor. The radiological evaluation was done on anteroposterior radiographs of the pelvis and anteroposterior and lateral radiographs of the hip at each visit, and compared with the intermediate retreat in search of edgings according to De Lee [8] for the acetabular component interface and according to Gruen *et al.* [9] for the femur. The inclination of the cup was evaluated according to the technique of Sutherland [10].

2.4 Statistical methods.

The statistical analysis was done using the software Epi-Info version 6.04. The quantitative variables were expressed on average and extreme values, the qualitative variables were expressed in percentage. The Kaplan-Meier method allowed the analysis of survival with a confidence interval of 95%, this by considering as event of end a revision of the implants or the death.

3. Results

On 56 patients included, none was lost sight; a patient (1.78 percent) had died independently of the surgery. No revision of implants was done. The survival cumulated without revision was thus of 100% in the last passing time. The average passing time was 6.5 years [range 1-9 yrs]. The score of Postel Merle d'Aubigné [7] at the revision was of 15.8 points [range 13 – 18 points] versus 9.1points [range 2 – 15 points] in preoperative with an average quotation of the pain of 5.8; an average quotation of the walk of 4.2 and a score of mobility of 5.2 (Table 3). With the last passing time, four patients had a low level of activity of which one of grade I and three patients grade II according to Devane [5].

Table 3: Evolution of Postel Merle d'Aubigné Score

Items	Preoperative	Number (%)	Postoperative	Gain
	PMA (range)		PMA (range)	
Pain	3,2 (2-5)	57 (98,27)	5,8 (5-6)	+ 2,6
Mobility	3,3(1-5)	43 (74,13)	5,2 (4-6)	+1,9
Walking/Stability	2,6(1-5)	15 (98,24)	4,8 (2-6)	+2,2
PMA Global	9,1(2-15)		15,8 (13-18)	+ 6,7

*PMA: Postel Merle d'Aubigné

Their level of activity had improved significantly compared with the preoperative level: 6, 89% sedentary in preoperative versus 5.17% active in postoperative. The global outcomes were satisfactory. The complications in cluded an precocious infection which progress favourably without replacement of implants; one case of paresis by stretching of the sciatic nerve. There was no mechanical loosening, however two patients presented non evolutive edgings in zones of 1 and 3 of the acetabular pivot. No femoral periprosthetic osteolysis was found. The average inclination of the cups was 42 degrees [range 35-50 degrees] and only one cup had a higher inclination 50 degrees (Figure3).

**Fig 3:** Higher inclination of cup

4. Discussion

Our retrospective study did not have any lost of sight. On the other hand it contain several limits: the clinical average of passing time seem to us short the finally conclude on the almost imposed relevance of the selection of the implants because of the limited technical equipment; Pre and postoperative CT scan were not performed to carry out with precision geometrical measurements of the cups just as the anteversion. With a survival rate of 100 percent in 9 years this study confirms the efficacy of the principle of the dual-mobility in the prevention of prosthetic instability. These outcomes are comparable with those of Philippot *et al.* [11] and Vielpeau *et al.* [12]. Despite the risk of posterior dislocation evoked in the literature, the initial approach was preferentially posterolateral in 96.56% of cases in this serie. It was paramount in several series [11, 12, 13, 14, 15]. No correlation was found between the choice of the initial approach and the etiology of the osteoarthritis of hip (hip disorders). In the literature, the choice of the approach did not have a consequence on the outcome.

The option of the Total hip Arthroplasty with dual-mobility was quasi imposed because of the lack of equipment in our series. However the initial indications of the hip replacement

with dual- mobility were represented by the femoral neck fractures, revisions just as the patients with risk of luxation. It is noted that the only restriction seems to be the young topic, which makes fear a risk of wear of polyethylene [12]; hence the evaluation in the medium and long term of the complications of the dual-mobility cups among these young topics because very few publications are dedicated to [16]. The Total hip arthroplasty realized in our series concerned young topics which the average age was 42.69 years [range 20 – 70yrs], with a peak of frequency between 20 - 50 corresponding to 60.34 percent of the cases. Discordance on the averages of age was found in series [11, 12, 17]. It can be explained by the preponderance of the sickle cell anemia in sub-Saharan Africa which concern young people (Table 2); contrary to the hip primary degenerative arthritis which affects aged subjects in the industrialized countries where life expectancy is high [18]. The mode of components implantation varied with the studies. The components with hydroxyapatite are mainly used in this series: the cups were impacted in 79, 31% and were sealed in 20, 69% (Figure 3); the couple metal on polyethylene was used in 100% of the cases (Table 2). Our series is comparable with the series of the symposiums of SOFCOT 2007 and 2009 [13, 14]. Our outcomes in terms of restoration of the anatomy is obtained by the use complementary gestures such as filling of the acetabular bottom by cancellous grafts (Figure2). These grafts coming from the femoral heads in 22 cases (37, 93%) made it possible to restore the femoral offset. One of the prognostic factors identified is the influence of the inclination of the cup. Its optimal orientation is defined by a safe zone, between 30 and 45 degrees of inclination compared to the line of the radiological U [19]. An inclination outside of this safe zone, would increase the risk of loosening or dislocation. In this series, the average inclination was 42 degrees. The improvement of the life quality after a Total hip arthroplasty is incontestable [20].

The functional scores with the last passing time are satisfactory. In the same way the repercussion on the walk was high for 15 hips. We note a significant improvement of the clinical scores in the passing time with a global Postel Merle d'Aubigné score passing from 9.1 to 15.8 points [range 13-17] that is to say a gain of +6.7. All the items of the score of Postel Merle d'Aubigné progressed (Table 3). Globally, the patients were much more optimistic than the surgeon: 94, 73% of the patients considered their outcomes excellent or good while the surgeon does accept for such only 85, 96%. Approximately 2% classified Charnley C, estimated that they did not benefit from the intervention since they were semi-sedentary.

5. Conclusion

Because of their etiologic diversities, degenerative disorders of the hip are in net increase due to the incidence of the complications of the sickle cell anemia. The functional and socioeconomic repercussions are important because the active young topics are most affected. This series of total hip arthroplasty with dual-mobility cup have shown a survival rate of 100% in medium term. These outcomes must be temperate because of the complications in long-term in relation to the dual- mobility implant among young topics.

6. Conflict of interest

None

7. References

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