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Ten-year clinical outcome and survival rate of cemented total hip arthroplasty in Yaoundé

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Abstract
Background: Since the introduction of cemented total hip arthroplasty in Cameroon in the 2000's, literature on long-term results is sparse. We report on the outcome of primary cemented total hip arthroplasty at least 10 years after surgery.
Materials and Methods: We retrospectively analyzed 40 consecutive primary cemented total hip arthroplasties performed between 2000 and 2012 in Yaoundé (Cameroon) and followed-up for a minimum period of 10 years. The patient's mean age was 46.4 years (range 13-66 years) and male to female ratio was 2:1. Clinical and functional evaluation included the Harris hip score (HHS), Merle d'Aubigne and Postel Score (PMA), visual analogue scales and patient's satisfaction. Antero-posterior (AP) radiographs of the pelvis or affected hip were evaluated on a consensus basis by two orthopaedic surgeons. Implant survival was evaluated using Kaplan-Meier curves with the primary end point being revision or need for revision for any reason.
Results: The ten-year survivorship of cemented total hip arthroplasty in Yaoundé was 35%. Results in all operated patients showed marked decreased in Harris hip score and PMA score at 10 years follow-up. The most common immediate complication was dislocation (20%) and long-term complication was Periprosthetic fracture (16%). The current state of unsatisfied patients was 62.5%. The outward appearance of the affected hip was characterized by atrophy of muscles (45%), limping (45%), Limb length discrepancy (45%). Acetabular osteolysis was present at 25% and radiolucent lines at the stem-cement interface were seen in 20(50%) hips.
Conclusion: These findings demonstrate that the 10 years clinical outcomes of the cemented total hip arthroplasty was poor in our setting, with a low survival rate. It is worth mentioning that these were the very first series of THA performed in Cameroon, and that these results can be linked to the learning curve.

Keywords: Total hip arthroplasty, cemented, long-term outcome, survival rate

Introduction

Total Hip Arthroplasty (THA) is regarded as the most successful surgical technique utilized in the field of orthopaedics [1]. It increases patient's quality of life (QOL), decreases pain, and provides a good functional outcome [2]. THA demand is on the rise as the number of elderly patients increases. Cemented THA was introduced more than 50 years ago, but the current trend is towards cementless hip arthroplasty [1]. However, recent studies report good outcomes of cemented THA and a 10-year survival rate of 95-100% [1, 3, 4]. Many factors including patient age, underlying disease, stem design, stem materials, cement type, and cement technique have been reported to affect outcomes of cemented THA [5-9]. Some parameters limiting long term performance include wear debris production, Periprosthetic bone resorption and aseptic loosening [10]. In Cameroon, the first THA were performed at the end of the 2000s. There were less than 5 orthopedic surgeons in the whole country at that time, and the operating environment was not optimal. The first THAs were all cemented, but the long-term outcome has not yet been studied. Furthermore, literature regarding long-term outcomes of THA in limited resources settings in Sub Saharan Africa is scarce.

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It is essential to evaluate the results in order to improve the outcome of THA in our context. Therefore, the aim of this study was to determine the long-term survivorship and clinical and radiological outcomes among patients with cemented THA performed and followed-up for more than 10 years in Yaounde.

Patients and Methods

We retrospectively evaluated the records of consecutive patients operated for primary cemented THAs at five tertiary care hospitals in Yaoundé between January 2006 and December 2012. We included patients who were operated for cemented total hip arthroplasty during the study period, were followed for at least 10 years, and who gave their informed consent to participate in the study. We excluded patients with incomplete files and lost to follow up.

Of the enrolled 49 patients, 5 were lost to follow-up and 4 died from unrelated causes within 10 years postoperatively. Thus, 40 patients were available for the implant survival assessment. There were 28 (70%) men and 12 (30%) women, with a mean age of 46.4 (range, 13-69) years at the time of surgery. There were no selection criteria for the use of cemented THA because all procedures were performed this way at that period. The right hip was involved in 22 (55%) patients, and no patient was operated on both hips in our series. Four experienced trauma surgeons, who were beginning their learning curve in THA, completed all procedures. TKA was performed through direct lateral approach (Hardinge) in 22 cases (55%) and the Watson-Jones approach in 18 cases (45%). Indication for THA included primary osteoarthritis (40%), avascular necrosis of the femoral head (30%), secondary osteoarthritis (20%) and femoral neck fracture (10%). The prostheses used were of Charnley and Muller's type. The aluminium head size used was size 28 mm in 36 patients (90%) and a standard neck length was used in 20 patients (50%). Bipolar cemented THA was done in 22 patients (55%), hybrid THA in 2 patient (5%) and reverse hybrid in 16 patients (40%), (Table 1).

Patients were invited for a radio-clinical final assessment at the time of the study. Clinical and functional evaluation was performed using the Harris hip score (HHS), Merle d'Aubigne and Postel Score (PMA), visual analogue scale and patient's satisfaction. Antero-posterior (AP) radiographs of the pelvis and lateral radiograph of affected hip were analysed on a consensus basis by two orthopaedic surgeons. The presence of radiolucent lines (RL) at the implant-cement interface or the bone-cement interface was evaluated as described by Gruen *et al.* [11]. Radiological loosening was assessed according to the criteria of Harris and McGann [12]. Survival was calculated using Kaplan-Meier curves with revision surgery (or the need for revision surgery) for any reason as primary end point.

Table 1: Baseline and clinical characteristics of the patients

Variable	Catégories	Value (N=40)
Age moyen (années)		46.4 ±14.8 [13-66]
Gender	Male	28 (70%)
	Female	12 (30%)
Operated Hip Side	Right	22 (55%)
	Left	18 (45%)
Indications for THA	Primary osteoarthritis	16 (40%)
	Avascular osteonecrosis	12 (30%)
	Post traumatic osteoarthritis	8 (20%)
	Femoral neck fracture	4 (10%)
Surgical approché Type of THA	Hardinge	22 (55%)
	Watson-Jones	18 (45%)
	Moore	0 (0%)
	Bipolar cemented THA	22 (55%)
	Hybrid THA	2 (5%)
	Reverse Hybrid THA	16 (40%)

Table 2: Complications

Variable	Catégories	Value (N=40)
Early complications	Dislocation	8 (20%)
	Surgical site infection	4 (10%)
	Periprosthetic fracture	2 (5%)
	No complication	26 (65%)
Long-term complications	Surgical site infection	6 (55%)
	Periprosthetic fracture	6 (45%)
	Acetabular cup loosening	4
	Dislocated femoral stem	2
	Malposition of the cup	2
Outward appearence of hip	Limb length discrepancy	18 (45%)
	Unexplained pain	18 (45%)
	Limping	18 (45%)
	Muscles atrophy	16 (40%)
	Presence of a Sinus	4 (10%)
	Sciatic nerve neurapraxia	2 (5%)

Fig 1: An 11-year survivor cemented THA. A, bilateral osteonecrosis of the femoral head stage 4; B, 1-year post-operative pelvic x-ray showing a cemented Charnley acetabular cup and cementless femoral stem. (*Courtesy National Center for Rehabilitation of people with disabilities, Etoug-Ebe Yaounde*); C, Eleven-year follow-up radiograph showing no evidence of component loosening

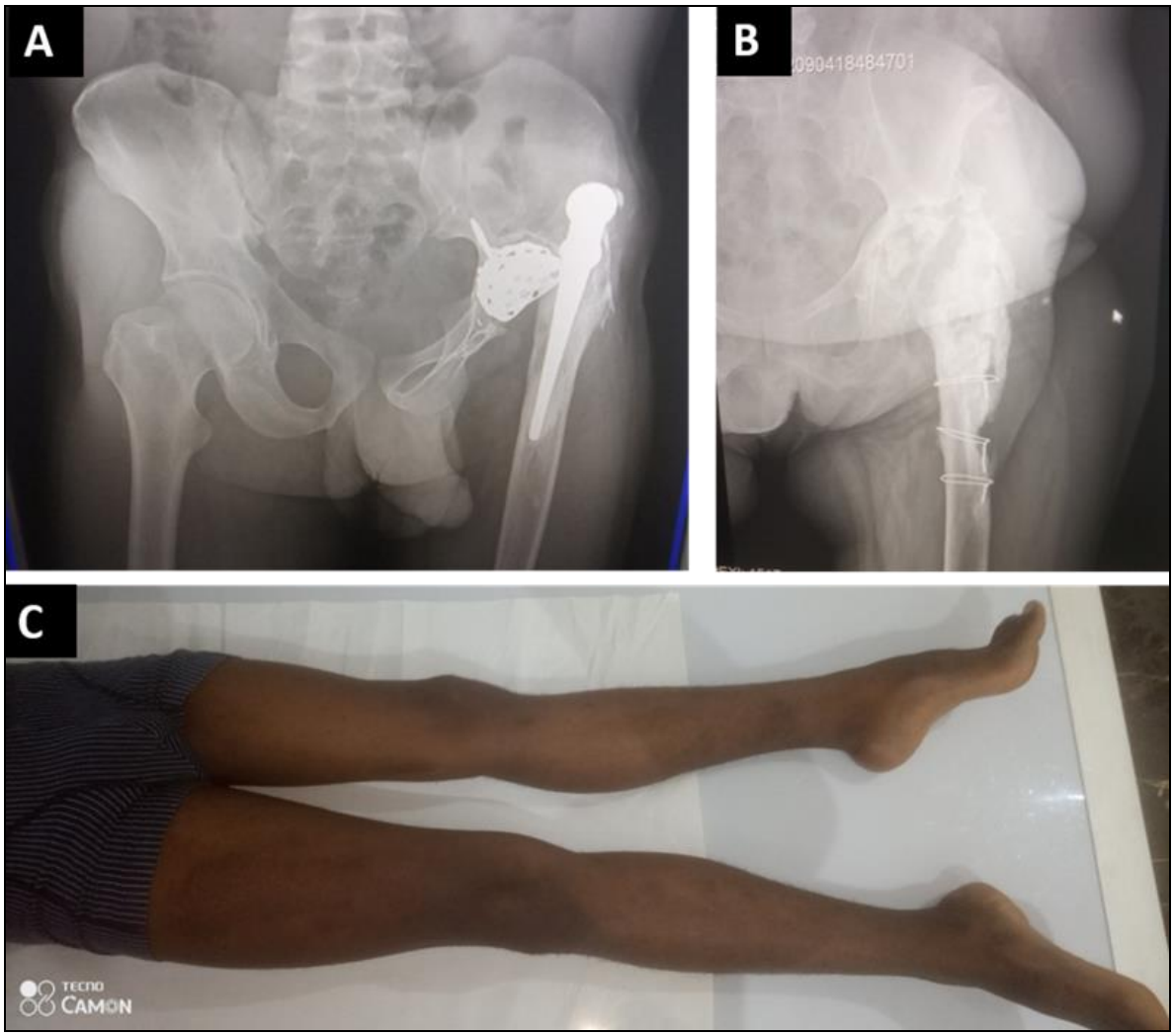

Fig 2: Few complications. A, a 10 year post-operative pelvic x-ray showing complete dislocation of the left THA with internal rotation of the femoral stem coupled with ascension of the femoral hip prosthesis towards the iliac bone. B, Girdlestone procedure done in a 76 years old female despite several debridement and revision surgeries; C, 10-year clinical examination of the patient showing atrophy of thigh muscles, limb length discrepancy of about 6 cm and sciatic nerve palsy

Statistical analysis

Data were entered into CSPro 7.5 and then analysed using Statistical Package for Social Sciences (SPSS) version 26 software for Windows, and then exported to Microsoft Excel 2016 for graphical presentation. Quantitative variables were expressed as mean ± standard deviation (SD) when the distribution was considered normal. The Chi-Square test or exact Ficher's test were used for the comparison of proportions and the student T test or its non-parametric equivalent for the comparison of means. Kaplan-Meier survival analysis was performed for the primary end point. The significance level was set at 5%.

Results

Survival rate

Of the 40 cases of THA enrolled, 26 required (or were requiring) revisions at a median follow up period of 12 years (range 10-16). The long-term survival rate of cemented total hip arthroplasty in this study was 35% (figure 1). Indications for revision among the 26 patients were: chronic prosthetic

joint infection (PJI) in 6 (15%) cases, Periprosthetic fractures in 6 (15%) cases, dislocation in 5 (12.5%) cases, acetabular cup loosening in 4 (10%) patients, stem loosening in 3 (7.5%) patients, and malposition of the acetabular cup in 2 (5%) cases. It is worthy to note that among the 6 patients that presented with chronic PJI, four have had early surgical site infection for which debridement, antibiotics and implant retention (DAIR) was done. The remaining two patients had a late onset PJI. Unfortunately, all the six patients ended up with Girdlestone proceduce being done (figure 2).

Clinical and radiological outcomes

Minimum ten years observation of the outer appearance of the hip and limb involved was marked by a limb length discrepancy in 18 patients (45%), limping in 18 (45%) patients and 18 patients (45%) had an unexplained mechanical pain. Sixteen patients (40%) had atrophy of hip/thigh muscles without loss of sensation, 4 patients (10%) had the presence of a sinus despite girdlestone procedure that was done and 2 patients (10%) had an unexplained sciatic nerve neurapraxia (Table 2). Fourteen (35%) patients were living with their hip prosthesis without any complication.

Radiolucent lines were seen in at least one of the three acetabular zones in 10 patients. Acetabular loosening was seen in 4 patients. RLs around the stem were observed in 9 patients, and 2 had stem loosening. Stem malalignment was observed in 10 patients. Fourteen patients had no radiological abnormality of the affected femoral component.

The mean pre-operative Harris Hip Score was estimated at 49.3 (10-72) points and at the final follow-up it was estimated at 44.5 (5-92) points. The final follow-up PMA score was 8.4 (3-17) and all patients were of category A (involvement of a single hip). In this series, 22 patients (62.5%) were unsatisfied with their outcomes.

At the time of evaluation, 4 patients had died: 2 patients died after 3 years and 5 years of insertion of the hip prosthesis from complications after several revision surgeries, 1 patient died from a chronic medical illness and the remaining died from DVT-PE complications 11 years after placement of THA.

Discussion

To the best of our knowledge, this is the first study reporting the long-term outcome of THA in our setting. Our results show that the more than 10 year's survival rate of cemented THA is low (35%).

At a mean follow-up period of 12 years, 65% of patients had developed complications needing revision surgery. Our results contrast with studies in high income countries where cemented primary total hip arthroplasty showed excellent long-term outcomes. In a series of 148 primary THA performed in japan between 2004 and 2008, Takaoka *et al*. reported a ten year survival rate of 99.3% [3]. Okutani *et al*. in japan reported that the 20 years survival rate with stem revision for aseptic loosening and radiological stem loosening at the end points were 95.9% and 97.1%, respectively [4]. These survival rates are similar to those observed in cement less THA in HIC [1, 13-14].

In an older study performed in USA, the revision rate of cemented TKA performed from 1970 to 1984 was 22.9% at average 14.5 years of follow-up [15]. The results of cemented primary total hip replacement have been excellent over the recent decades, with national joint registries reporting revision-free survival rates between 90% and 98.2% at ten years [16-18]. The very low survival rate in our study could be due to many factors. First, all surgeons performing these surgeries were at the beginning of their learning curve since this is the first series of THAs performed in the country. This could have led to cementing issues, failures in implant placement, and extension of operating time. Second, the surgical environment in our setting at that time did not meet standards, which may have led to a high incidence of infections needing revision. It would be important to compare these results with those of cement less THA performed more recently in our environment which has seen some improvements but which remains to be improved.

The main indications for revision were chronic prosthetic joint infection (15%) Periprosthetic fractures (15%), dislocations (12.5%), and acetabular/stem loosening (17.5%). Okutani *et al*. found that the main reasons for revision were aseptic loosening including progressive osteolysis of the femoral stem/socket and infection [4]. Takaoka reported only two stems revisions over 140 THA for deep infection [3]. Fyda *et al*. reported that the reasons for revision were aseptic loosening (13%), sepsis (2.2%) and recurrent dislocation (2.2%) [15]. In a consecutive series of cement less THA in 203 patients in France, Schwartz *et al*. reported a 3.4% revision rate over ten-year follow-up, the reasons being intraprosthetic dislocation in 3 cases, Periprosthetic fracture for 2 cases, cup loosening in one case and persistent femoral mechanical pain in one case [13]. In two previous studies in Cameroon, Manga *et al*. reported that the main complications requiring revision were dislocation (5.2%), PJI (5.2%), aseptic loosening (3.48%) and Periprosthetic fracture (0.87%) [19]. Farikou *et al*. reported 14.7% of dislocations, 5.8% of septic loosening at a mean follow-up period of 30 months [20].

It should be mentioned that in our series, the majority of patients requiring revision could not do so for obvious financial reasons. Financial considerations for revision are primary deciding factors in low-resources setting rather than need [21]. Thus, several patients with chronic PJI ultimately had a definitive Girdlestone procedure (Figure 2). It is the same for patients with repeated dislocations who ultimately live with their dislocated prosthesis due to financial issues to purchase a new prosthesis. Still others live with chronic pain due to prosthetic loosening. This explains that unlike all the studies where the functional outcome after ten-year follow-up was good [3, 4, 15, 21, 22], the Harris hip score was only 44.5 in this series, which reflects a poor functional outcome. These poor results obtained at the dawn of THA in Cameroon must be profoundly improved to limit the evacuations of patients to foreign countries.

Conclusion

This study found that the 10-year survival rate of the first cemented THAs performed in Yaoundé is very low. The major complications encountered in the course of survivorship are infection, Periprosthetic fracture, dislocation, aseptic loosening, and pain. The functional outcomes at 10 years is poor compared to the literature. We hope that the improvements in technical platforms observed in recent years as well as in the learning curve will allow for better survival of THAs performed today. Further improvements are necessary as well as a study comparing the results of cemented versus cemented less arthroplasty in our environment.

Author Contributions

All the authors contributed to the conduct of this work, and all the authors read and approved the final version of the

manuscript.

Conflicts of Interest
The authors do not declare any conflict of interest.

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