ORIGINAL ARTICLE

Long Cemented Femoral Stem in Hip Revision: Variables Affecting the Early Results

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Background	It is believed that total hip arthroplasty (THA) has made a revolution in the way of treatment of hip arthritis. With an increasing number of younger patients undergoing THA, the incidence of revision hip surgery is on the rise. Revision THA is a technically difficult procedure and associated with higher complication rates.
Purpose	The aim of this study was to evaluate the results of long stem femoral component in revision THA.
Subjects and Methods	This study included 20 patients, 15 (75%) men and five (25%) women. The mean age of 61.8 years ranging from 50 to 75 years. The right side was affected in 12 (60%) patients and the left side was affected in eight (40%) patients. Nine (45%) patients were retired employees, six (30%) were employees and five (25%) were housewives. The mean of the patients' BMI was 25.9, ranging from 20.6 to 31.2. Two (10%) patients were diabetes mellitus and two (10%) patients were hypertensive. Lateral approach was used in all patients. Indication for revision was aseptic loosening in 13 (65%) patients. The mean evaluation period was 35.75 months (range from 12 to 56 months). The patients were evaluated both clinically using Harris Hip Score (HHS) and radiologically which improved from mean of 46.2 to 78.35 points.
Results	Seven (35%) cases of intraoperative femoral fractures, 2 (10%) cases had dislocations, one (5%) case had superficial infection. 12 (60%) patients had the femoral stem in a neutral position, six (30%) had it in a varus position while two (10%) patients had the stem in a valgus position. As regards lucent lines around the femoral stem, nine (45%) patients had it in 1 zone, four (20%) patients in 2 zones, and one (5%) patient in 3 zones. These lines were not progressive and did not affect the clinical outcome of these patients. Significant negative correlation was found between the final Harris Hip Score and patients' BMI and Trendelenburg test. Pain and patient activity and mobility improved significantly after revision with a long stem femoral prosthesis.
Conclusion	Long-stem is a useful option in revision THA but with high incidence of intra and postoperative complications. Intraoperative femoral fracture is the commonest complication and usually easy to manage by cerclage wiring.
Keywords	Arthroplasty, Cemented, Hip, Long-stem, Revision.

INTRODUCTION

Total hip arthroplasty (THA) is the most commonly performed adult reconstructive hip procedure. The increasing number of THA surgery and the widen indications resulted in increase in revision operation which is more difficult and with lower rate of success with high economic burden [1]. Indications of revision THA include: aseptic loosening of one or both component, periprosthetic fractures, recurrent dislocation, infection, and other miscellaneous causes [1-3].

The goals of revision is to provide patients with painless stable joint with functional level to enable acceptable activities [3,4].

The use of cemented long stem is among many revision options, including cementless long stem and the use of impaction grafting technique or even the use of strut femoral graft when dealing with a deficient femoral bone stock during revision surgeries [2-5]. Cemented long stem has the advantages of bridging the weak femur to a rather healthier intact region distally and it is not expensive. While cemented long stem has many disadvantages including early loosening, poor cementation, and difficult re-revisions [4]. The aim of this study was to evaluate the early results and complications of the use of cemented long stem femoral stem in hip arthroplasty revision.

SUBJECTS AND METHODS

20 consecutive group of patients had revision hip arthroplasty using long-stem femoral prosthesis were included in this study. All patients had their surgery through lateral Approach. Mean follow-up of these patients was 52 range from 41-58 months. All patients were evaluated clinically using Harris Hip Score (HHS) [6] and radiologically using Roman software developed by Frank Cook in Robert Jones and Agnes Hunt Orthopaedic institute to measure femoral stem alignment, offset, subsidence, heterotopic ossification using Brooker classifications [7], radiolucent lines using Grunes Zones [8].

The mean age was 61.8 years range (50-75years). 15 (75%) were males and five (25%) were females. 12 (60%) had revision of right side and 8 (40%) left. Nine (45%) patients were retired employees, six (30%) were employees, and five (25%) were house wives. 10 (50%) patients were of normal weight, seven (35%) patients were overweight, and three (15%) patients were obese. Two (10%) patients were diabetes mellitus. Two (10%) patients had hypertension, and 16 had no co morbidity.

11 (55%) patients had cemented THA, three (15%) patients had cementless THA. Six (40%) patients had conversion from hemi arthroplasty to THA (Table 1).

Indication for revision:

indication for revision was aseptic loosening in 10 (50%) patients, periprosthetic fractures in three (15%), septic loosening in four (20%), and recurrent dislocation in three (15%).

Table	1: Distribution	of patients	according	to	previous	surgery	7
on the	affected hip						

Previous surgery on the affected hip	Frequency	Percentage
Cemented THA	11	55%
Cementless THA	3	15%
Austin Moore hemiarthroplasty	2	10%
Cemented Thompson	2	10%
Bipolar hemiarthrop lasty	2	10%
Total	20	100%

Statistical analysis:

Descriptive statistics using mean and standard deviations and significant test by using IBM SPSS software package version 20.0. were performed. This study was approved by the ethical committee at the hospital where it was carried out. All patients provided consent for participation in the study.

RESULTS

At the last follow-up, the mean of the HHS improved significantly from 46 (range 24-60) to 78 points (range from 44 to 95). Six (30%) patients had excellent clinical results (HHS>90), Five (25%) had good results (HHS 80-90), five (25%) had fair results (HHS 70-79), four (20%) had poor results (HHS<70) (Table 2). 12 (60%) patients had no pain, five (25%) had slight occasional pain and three (15%) patients had pain that limits their daily activities. Seven (35%) patients had no limping, eight (40%) had slight limping and five (25%) had moderate limping. Three (65%) patients needed no support, four (20%) used cane for long walks, three (15%) used can most of the time.

Radiological evaluation Femoral offset

Mean femoral offset was 32.11 ± 6.7 . Mean femoral stem alignment angle was $-0.78\pm3.8^{\circ}$, 12 patients had the femoral stem in neutral position, six stems were in varus and two were in valgus position. Six patients had no radiolucent lines, nine had on radiolucent line at 1 zone, four had radiolucent line at 2 zones and one patient had lucent lines at the 3 zones.

Factors that affected the final outcome

Males had significant higher clinical score when compared with females (p<0.001). There was a negative correlation between BMI and final score but the relation was statistically insignificant (p=0.298). The presence of positive Trendelenburg sign and gait significantly was related to unsatisfactory results (p<0.001) (Table 3). Age, medical co-morbidity, previous surgeries, approach, the reason for revision, femoral stem alignment, radiolucent lines and cementing technique did not significantly affect the results.

Complications

Seven patients sustained intraoperative femoral fractures which were treated by cerclage wiring on top of long-stem (Figure 1). Two patient had early postoperative posterior dislocation (first 4 weeks). Both were successfully treated by closed reduction and hip abduction brace for 6 weeks. One insulin dependent diabetes mellitus patient had superficial wound infection which was treated my wound care and antibiotics for 5 days. No statical significance relation was found between clinical score and the presence of complications.

Table 2: HHS at the end of follow-up

Final HHS	Number of patients (Percentage)
Excellent	6 (30%)
Good	5 (25%)
Fair	5 (25%)
Poor	4 (20%)
Total	20 (100%)

Final HHS					
	Poor	Fair	Good	Excellent	Total
	<i>`<</i> 70'	'70-79'	·80-89'	·90-100'	(<i>n</i> =20)
	(<i>n</i> =4)	(<i>n</i> =5)	(<i>n</i> =5)	(<i>n</i> =6)	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Trendelenbu	ırg test				
Negative	0	0	5 (25.0%)	6 (30.0%)	11 (55.0%)
Positive	4 (20.0%)	5 (25.0%)	0	0	9 (45.0%)
Total	4 (20.0%)	5 (25.0%)	5 (25.0%)	6 (30.0%)	20 (100.0%)
χ^2		20.00^{*}			
MC		< 0.001*			

Table 3: Relation between the final HHS and Trendelenburg test

 χ^2 : Chi square test; MC: Monte Carlo test; *Statistically significant at $p \le 0.05$.



Figure 1: Intraoperative femoral fracture treated with cerclage wiring.

DISCUSSION

The number of revision total hip arthroplasty is increasing in number and difficulties Harkess and Crockarell, Zalzal and colleagues [1,2]. Poor femoral bone stock is one of the challenging complication of multiple hip surgeries including hip revisions. long-stem cemented femoral prosthesis remains an easy and not expensive option in treating femoral bone loss in revisions Berry and colleagues [3]. The long-stem would bypass bone deficiencies to healthier area. In the present study after a mean of 52 months, while HHS improved dramatically from 46 to a mean of 78 points still only 55% of patients had either excellent or good results which reflects the lower rate of success in this revision cases. This results reflects what obtained in other reports of low success rate of long-stem revision arthroplasty Harkess and Crockarell, Berry and colleagues, Sharvill and colleagues [1,3,9]. Cemented long-stem revision appears to be reserved to less active elderly only Weiss and colleagues [10]. Some authors recommended cementless modular stems Kim and colleagues, Issack and colleagues [11-14]. In the present study the mean age is 61.8 years with about five (25%) patients above 70 years with expected bone fragility and expected to have intraoperative femoral fractures which amount to 44% Husted and colleagues [15].

Males patients scored significantly higher clinical score which might be explained by expected better bone quality or the smaller BMI Toossi and Johanson [16]. Eight (40%) had some degree of pain in the present study. Same obtained by Krushell and colleagues [17] study in which 16 (62%) cases had no pain while the rest had mild to moderate pain reflecting the frequent persistent of pain in such difficult surgery. Trendelenburg sign and gait significantly was related to unsatisfactory results. Mulliken and colleagues [18] emphasized the problem of abductor weakness either as a result of direct muscle injury or injury to the superior gluteal nerve in primary and revision THA. All patients in the present study had their revision through lateral approach which might explain the significance of this problem.

In the present study 35% of patients needed walking aid. Nearly similar results obtained in Krushell and colleagues [17] study where 31% of cases used some form of walking support.

Cementation of long-stem is known to be of lower quality in most of the studies Soliman [4]. In this study using second generation cementing technique, only one patient was considered clinically loose (lucent lines in three zones. This reflects determination by the surgeon to improve the quality of cementation to avoid early loosening as the main reason of failure in long-stem femoral revision. Trendlenburg gait and limping was

Femoral fractures (Figure 2)

Figure 2 Intraoperative femoral fractures occurred in seven (35%) patients. High intraoperative femoral fractures is a common finding in revision THA with longstem. ranging from 1-46%. Malkani and colleagues [20] reported a 46% femoral fractures using cementless longstem prosthesis. They describe that most fractures are above or extended just below the lesser trochanter. Malhotra and colleagues [21] in their series of 21 patients reported three (15%) patients with fracture at the tip of the prosthesis. In the present study the presence of these intraoperative fractures was easy managed by cerclage and did not seem to affect the final outcome.



Figure 2: Periprosthetic femoral fracture treated by long stem cemented THR

CONCLUSION

Long-stem is a useful option in revision THA but with high incidence of intra and postoperative complications. Being most common complication, intraoperative fracture does not seem to affect long-term results and is usually managed successfully intraoperatively by cerclage.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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