

# EFFICACY OF CEMENTLESS TOTAL HIP ARTHROPLASTY IN STEROID INDUCED FEMORAL HEAD OSTEONECROSIS

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## ABSTRACT

**Background:** Steroid-induced femoral head osteonecrosis in young adults has been a challenging disorder due to femoral head collapse and resulting dysfunction of the hip joint. Total hip arthroplasty is a cost-effective procedure that relieves pain and restores arthritic hip function. The aim of the present study to analyzed the outcomes of cementless total hip arthroplasty in patients with femoral head osteonecrosis due to steroids.

**Patients and Methods:** Prospective study performed on 18 patients with steroid induced femoral head osteonecrosis from January 2020 to January 2021. Cementless implants were used in all patients. 8 males and 10 females with mean age of 36.39 years (range: 23-52). Modified Harris Hip Score was used for clinical evaluation preoperatively, postoperatively and at follow up.

**Results:** There was a significant increase in modified Harris hip score among cases postoperatively compared to preoperatively. Excellent results were in 1 hip (5.5%), good results in 12 hips (66.6%), fair in 4 hips (22.2%), and 1 hip (5.5%) had poor results. There were complications in 22.2% of patients, three patients (16.7%) suffered from infection and two patients (11.1%) suffered from dislocation.

**Conclusion:** Cementless THA in young patients with steroid induced osteonecrosis is fairly encouraging. They ensure good clinical outcome with minimal complications and low rate of loosening.

**Keywords:** Harris hip score; Hip Arthroplasty ; Osteonecrosis

## INTRODUCTION

Osteonecrosis (ON) of the hip, with its different causes and poorly understood pathogenesis, is disabling disease primarily affecting the active population in the third and fourth decades of life (1).

The exact mechanisms of steroid-induced osteonecrosis remain unknown, with the disease developing in only 8%–10% of all steroid users (2). Of many different operations available to the treatment of osteonecrosis of the femoral head, the total hip arthroplasty (THA) can be considered the single treatment with the highest likelihood of providing an excellent early relief of pain and achieving a good outcome for the functional recovery (3).

The high activity level of patients with osteonecrosis and the ongoing poor bone quality and continued use of steroids in this patient population have been proposed as factors contributing to poor results (4).

In this study, results of cementless total hip arthroplasty in patients with Ficat stage 3 and 4 femoral head osteonecrosis were evaluated.

## Patients and Methods

We prospectively performed cementless total hip arthroplasty on 18 patients with steroid induced osteonecrosis of femoral head. Written consent was obtained from all patients included in our study. The study was done on the left side of 11 cases and the right side of 7 cases.

Ten cases had bilateral hip osteonecrosis but only operated on one side because they were operated by another surgeon earlier than the start of our study. The following protocol was applied to all patients: Full history taking, detailed general examination to exclude other medical or systemic diseases. Then local hip examination. Back and knee examination to exclude other pathologies. Pelvis X-ray was ordered to all cases. Computerized tomography was ordered to some patients. MRI (1.5 tesla) was ordered to one case. Clinical evaluation using modified Harris hip score.

## Surgical technique:

Spinal or epidural anesthesia was given. The lateral Hardinge approach was utilized in all operations. Cementless implants were used in all cases. The acetabular cup was anatomic and sometimes secured by two or three screws, while the femoral stem was pressfitted. Postoperatively, clexane 40 I.U was given to prevent deep venous thrombosis in all cases. Indomethacin 50 mg daily dose for four weeks was given to prevent heterotopy ossification. Partial weight bearing was allowed using axillary crutches in the first 4-5 weeks postoperatively and full weight bearing with elbow crutch in the contra lateral side after 6 to 10 weeks.

## Statistical analysis:

Data collected using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) software for analysis. According to the type of data qualitative represent as number and percentage, quantitative continues group represent by mean  $\pm$  SD, the following tests were used to test differences for significance. P value was set at <0.05 for significant results & <0.001 for high significant result.

## RESULTS

The age of patients was between 23 and 52 years with mean 36.39 years (**Table 1**). Regarding sex distribution 55.6% were females (table 1). Regarding laterality of osteonecrosis, ten patients (55.6%) had bilateral lesions while 44.4% had unilateral lesions (**Table 2**). About 61.1% of the studied group had osteonecrosis in left side. Regarding previous operations performed, was core decompression in 6 hips (33.3%). Regarding Ficat staging of osteonecrosis, thirteen patients (72.2%) had Ficat stage 4 osteonecrosis while 27.8% of the studied patients had stage 3 (**Figure 1**). Regarding complain, all the studied group had pain, 66.7% had limited mobility and 41.7% were unable to bear weight. All patients had regular follow up visits for a period around 6 months. Clinically, the mean modified Harris Hip Score increased from 42.94 (range, 24–54) preoperatively to 82.06 (range, 69–91) postoperatively [ $p < 0.001$ ] (**Figure 2**).

At the last follow up, we got excellent results in 1 hip (5.5%), good results in 12 hips (66.6%), fair in 4 hips (22.2%), and 1 hip (5.5%) had poor results. There was significant statistical increase in all categories of modified Harris hip score. Pain in most cases improved from moderate with occasional exacerbation (20 points) preoperatively to no pain (44 points) postoperatively. Limping improved markedly from slight or moderate limping (8-5 points) to no limping (11points) postoperatively. According to walking with or without support, patients improved significantly as 66.7% of them used to use cane most of time preoperatively (5 points) but postoperatively they walked with no support (11points) or used cane only for long walks (7points).Preoperatively, patients walked only for short distances with an average for 15–30minutes (5 points) and postoperatively they walk freely for unlimited distances (11points). Climbing stairs was so difficult preoperatively (1 point) but postoperatively, patients were able to climb stairs normally or assisted with handrail (4 or 2 points). Most individualspreoperatively couldn't wear shoes with ease (2points), but they improved after surgery and could wear shoes easily (4 points). Also half of patients were unable to sit on any chair (0 point) and became better postoperatively and could sit on any chair for one hour or more (5 points). Preoperatively, 50 % of patients were unable to use public transportation (0 point) but postoperatively they became able to use them (1 point) (**Table 3**).

**Table (1): Distribution of the studied patients according to demographic data**

	N=18	%
<b>Age (year):</b>		
<b>Mean ± SD</b>	36.39 ± 10.1	
<b>Range</b>	23 – 52	
<b>Gender:</b>		
<b>Female</b>	10	55.6%
<b>Male</b>	8	44.4%

**Table (2): Distribution of the studied patients according to laterality of lesion**

	N=18	%
<b>Laterality:</b>		
<b>Bilateral</b>	10	55.6%
<b>Unilateral</b>	8	44.4%

**Table(3): Comparison between components of MMHS pre and postoperatively among the studied patients.**

Components	Preoperative	Postoperative	p
	N=18 (%)	N=18 (%)	
<b>Pain</b>			0.001**
None or ignores it	0 (0)	11 (61.1)	
Slight, occasional	0 (0)	4 (22.2)	
Mild pain	0 (0)	3 (16.7)	
Moderate pain	16 (88.9)	0 (0)	
Marked pain	2 (11.1)	0 (0)	
<b>Limp:</b>			0.001**
None (11)	0 (0)	15 (83.3)	
Slight (8)	11 (61.1)	3 (16.7)	
Moderate (5)	7 (38.9)	0 (0)	

Severe (0)	0 (0)	0 (0)	
<b>Support:</b>			
None	0 (0)	8 (44.4)	0.001**
Cane, long walk	2 (11.1)	10 (55.6)	
Cane, most of time	12 (66.7)	0 (0)	
One crutch	4 (22.2)	0 (0)	
<b>Distance:</b>			
Unlimited	0 (0)	9 (50)	0.001**
Six blocks	10 (55.6)	9 (50)	
Two to three blocks	8 (44.4)	0 (0)	
<b>Stair:</b>			
Normally without rail			0.001**
Normal with rail	0 (0)	15 (83.3)	
In any manner	11 (61.1) 7 (38.9)	3 (16.7) 0 (0)	
<b>Shoes and socks:</b>			
With ease	2 (11.1)	15 (83.3)	0.001**
With difficulty unable	11 (61.1) 5 (27.8)	3 (16.7) 0 (0)	
<b>Sitting:</b>			
Ordinary chair for 1hour			0.001**
High chair for 1 hour	7 (38.9)	13 ( )	
Unable to sit on any chair	2 (11.1) 9 (50)	5 ( ) 0 (0)	
<b>Public transport:</b>			
Able to use	9 (50)	18 (100)	0.001**
Unable to use	9 (50)	0 (0)	

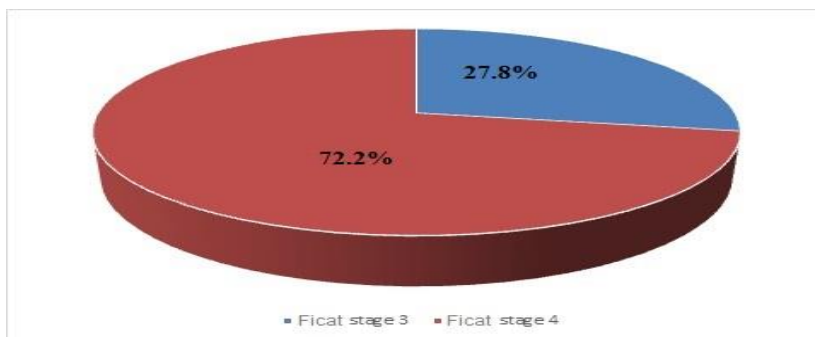


Figure (1): Pie chart showing distribution of the studied patients according to Ficat stage.

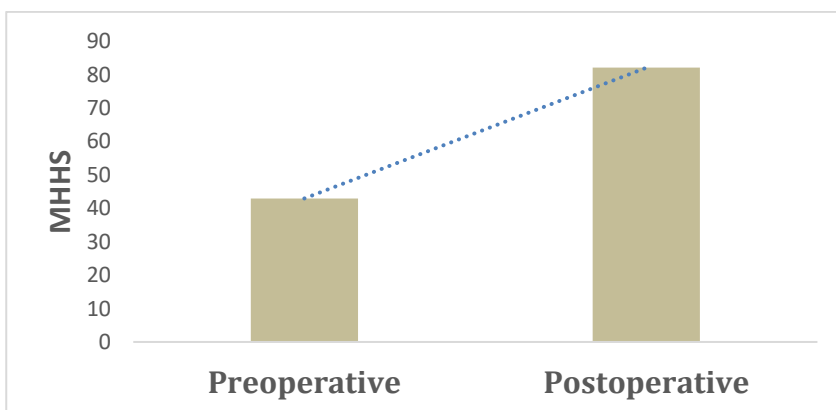


Figure (2): Simple bar chart showing MHHS pre and postoperatively among the studied patients.

## DISCUSSION

Osteonecrosis of the femoral head is a progressive condition that often leads to collapse of the femoral head. The ultimate goal in the treatment for osteonecrosis of the hip is preservation of the femoral head (5, 6). However, the condition is difficult to treat because it is associated with a number of different diseases, and the etiology and natural history of the condition have not been definitively determined (7). The delineation of new information regarding the etiology, pathogenesis, and natural history of osteonecrosis is ongoing (8).

This study demonstrates that there is no significant difference between both groups as regarding socio-demographic data and this is consistent with **Alexiades et al. (9)**.

In our study, cementless total hip arthroplasty was performed on Ficat stage 3 and 4 patients whose incapacitating pain could not be managed conservatively. No significant differences were found between the stage 3 and 4 patients as regard pre and postoperative improvements in the hip scores. So, we can conclude that: There are no significant differences between stages 3 and 4 according to Ficat staging, which is mainly an anatomical staging system. Second, cementless total hip arthroplasty creates no significant differences as regards postoperative healing between stage 3 and 4 patients. **Dudkiewics et al. (10)** evaluated the influence of the etiology of osteonecrosis on the results, and reported that the final functional outcomes were not influenced from the etiology; however, the lifespan of the implant in osteonecrosis related to steroids was shorter. We did not see any evidence indicating this. This may be due to the short period of our study. The incidence of infection following THA ranges from 1% to 3% (11).

The infection rate for THA in steroid-induced osteonecrosis ranges from 1.3% to 19% in various studies (12). In this study, the infection rate was 16.7% ; this only represents 3 hips, and from our small sample size, it is difficult to make any firm conclusions about the incidence of periprosthetic infection in patients with steroid-induced osteonecrosis compared with the general THA population. In the literature, the prevalence of postoperative periprosthetic fractures ranges from 0.1% to 2.1% depending on the series reviewed (13).

In this study, the prevalence of periprosthetic fracture was 0%. Our sample size was too small to generalize or comment on incidence of the periprosthetic fracture among cementless fixation. In our study, we encountered 2 cases of dislocation. We can attribute this to liner break down in one case and weak abductors in the other one. In this study; we used modified Harris hip score which showed improvement in all of its components. The mean MHHS improved from 42.94 preoperatively to 82.06 postoperatively. The results were excellent in 5.5 % of patients, good in 66.6 % of patients, fair in 22.2 % of patients and poor in 5.5 % of patients. This poor result was due to mild pain and limping. **Gupta et al. (14)** used modified Harris hip score which improved from 28 preoperatively to 86 points at 6 months follow-up.

## CONCLUSION

One year follow-up of cementless total hip arthroplasty is fairly promising. The modified HHS increased dramatically. Combined with suitable indications, cementless implants ensure good clinical outcomes with minimal complications and low rate of loosening according to this study. They are recommended for hip replacement in relatively young patients. We recommend longer term follow up for better evaluation of the longevity of the prosthesis.

**No conflict of interest.**

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