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ORIGINAL ARTICLE

Cementless Total Hip Arthroplasty in Steroid Induced Osteonecrosis of Femoral Head.

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ABSTRACT

Background: Steroid-induced femoral head osteonecrosis in young adults has been challenging 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. Aim of work: better management of steroid induced femoral head osteonecrosis**.**

Methods: Our study was performed on 18 patients at Orthopedic department, Zagazig University Hospitals from first of August 2020 to end of January 2021. All cases were treated by cementless THA. 8 males and 10 females with mean age of 36.39 years (range: 23-52). The etiology was femoral head osteonecrosis due to steroid intake for treating different diseases. Clinically, the indications of operation were intolerable pain and limitation of hip motion. Modified Harris Hip Score was used for clinical evaluation preoperatively, postoperatively and at follow up.

Results: Regarding sex distribution, 55.6% were females. There was significant statistical 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, two patients(11.1%)suffered from dislocation.

Conclusion: Six months follow up of cementless total hip arthroplasty are fairly encouraging. Combined with suitable indications, cementless implants ensure good clinical outcome with minimal complications and low rate of loosening and are recommended for hip replacement in relatively young patients.

Keywords: Total hip, osteonecrosis, femoral head.

INTRODUCTION

The aetiology of femoral head osteonecrosis is multifactorial, unclear and partly unknown but it is the final common pathway of traumatic or a traumatic insult that compromises and interrupts the blood supply to the femoral head.**[1]** The collapse of the femoral head, accompanied by secondary osteoarthritic changes occurs towards the later course of the disease. When this damage is beyond salvage by any other means, i.e: drilling, varus derotation osteotomy, or free vascularized graft, three options remain for treatment in young patients: total hip arthroplasty (THA), arthrodesis of the hip joint and resection arthroplasty of the femoral head.**[2]** Total hip arthroplasty (THA) is indicated when hip pain becomes intolerable and when the femoral head has collapsed and the joint shows advanced arthritic changes.**[3]** THA remains the only helpful solution in the late stages of osteonecrosis; however, in the long run, it is associated with higher failure rates in young individuals when compared to older populations. Moreover, it is believed that there is a difference in the prognosis of THA performed for different causes of osteonecrosis. The results of THA for osteoarthritis are more satisfactory compared with osteonecrosis.**[4]** There is a debate about implant fixation and the best bearing coupling for these high-demand young patients. The advances in surgical techniques and prostheses designs have

improved the overall survivorship of total hip replacement (THA) in general. However, there are mixed reports about the improvement in patients with osteonecrosis.**[5]**

METHODS

This was a prospective study in concordance with STARD guidelines conducted over six months from the first of August 2020 to the end of January 2021 in the Orthopedic Department, Zagazig University Hospital. Written informed consent was obtained from all participants. The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans. Approval for this study was given by IRB, Zagazig faculty of medicine. No conflict of interest. This study was performed upon eighteen hips in eighteen cases with steroid-induced hip osteonecrosis. The study was done on the left side of eleven cases and the right side of seven cases. Ten cases had bilateral hip osteonecrosis but only operated on one side because they were operated on by another surgeon earlier than the beginning of our study. All cases were subjected to the following protocol: 1. Full history taking with stress on name, age, sex, address and past history of orthopaedic surgery.2. Detailed general examination to exclude other medical or systemic diseases. Then local hip examination. 3. Back and knee examination to exclude other pathologies.4. Pelvis X-ray was ordered for all cases.5.Computerized tomography was ordered for some patients. 6. MRI (1.5 tesla) was ordered to case two 7. Clinical evaluation using modified Harris hip score. Surgical technique: Spinal or epidural anaesthesia 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 to three screws, while the femoral stem was press fitted. Postoperatively, Clexane forty I.U. was given to prevent deep venous thrombosis in all cases. Indomethacin fifty mg daily dose for four weeks was given to prevent heterotopic ossification. Partial weight bearing was allowed using axillary crutches in the first four to five weeks postoperatively and full weight bearing with elbow crutch in the contralateral side after six to ten weeks.

STATISTICAL ANALYSIS

The collected data was computerized and statistically analyzed using the SPSS program (Statistical Package for Social Science) version 16.0. Qualitative data were represented as frequencies and relative percentages. Quantitative data were expressed as mean ± SD (Standard deviation).The chi-square test (χ^2) or Fisher's exact test was used to calculate the difference between qualitative variables. Student t-test was used to calculate the difference between quantitative variables. The results were considered significant when the Probability (P value) was less than 0.05, highly significant if it was less than 0.01 and very highly significant if it was less than 0.001.

RESULTS

The age of patients was between 23 and 52 years with a mean of 36.39 years (table 1). Regarding sex distribution, 55.6% were females (table 1). 66.6% of the studied group were from rural areas and 33.4% were from urban areas. Regarding the laterality of osteonecrosis, ten patients (55.6%) had bilateral lesions while 44.4% of the studied patients had unilateral lesions (table 2). 61.1% of the studied group had osteonecrosis on the left side. Regarding the cause of steroid intake, most frequently was to be fatter, treating bronchial asthma and rheumatoid arthritis (22.2%,16.7 & 16.7% respectively) (table 3). 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 complaints, 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 of 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%) poor results.

Table (2): Distribution of the studied patients according to demographic data.

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

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

	N=18	%
Laterality:		
Bilateral	10	55.6%
Unilateral	8	44.4%

Table (3): Distribution of the studied patients according to the cause of taking steroids that led to osteonecrosis.

	N=18	%
Being fatter	4	22.2
Bronchial Asthma	3	16.7
Chronic back pain	1	5.6
Chronic Cough	1	5.6
Glomerulonephritis	1	5.6
Multiple Sclerosis	2	11.1
Psoriasis	1	5.6
Pulmonary Fibrosis	2	11.1
Rheumatoid Arthritis	3	16.7

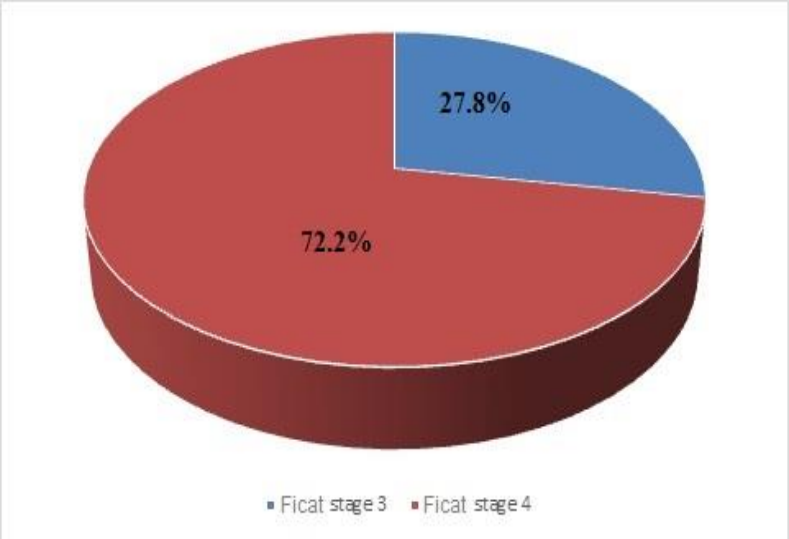

Figure (1): Pie chart showing distribution of the studied patients according to Ficat stage.

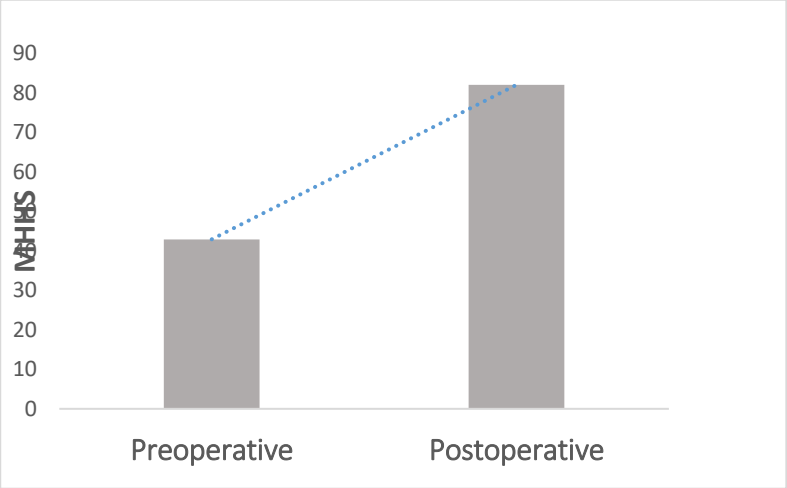

Figure (2): Simple bar chart showing MHHS pre and postoperatively among the studied patients.

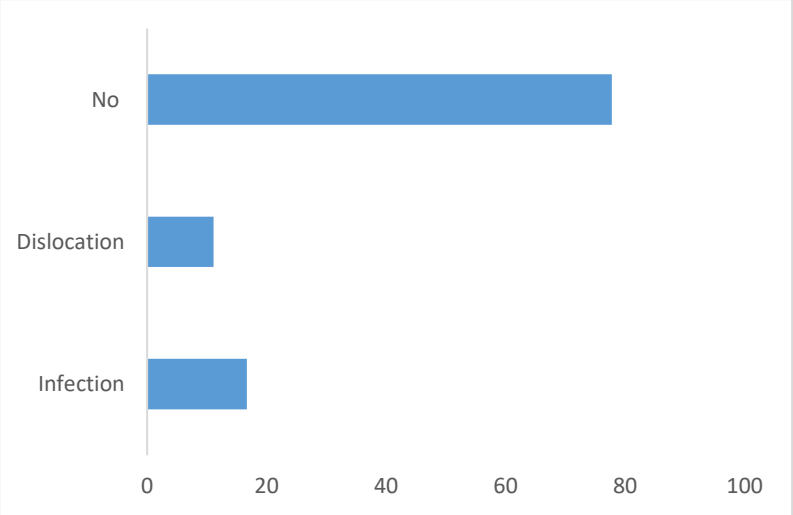

Figure (3): Simple bar chart showing distribution of the studied patients according to postoperative complications.

DISCUSSION

Osteonecrosis is a disabling disease that may progress to the collapse of the subchondral bone and damage the articular cartilage covering the joint. Despite continuous efforts, we still do not fully understand the pathogenesis of this disorder. Of many different operations available for treating femoral head osteonecrosis, total hip arthroplasty (THA) can be considered the solution with the highest likelihood of early relief of pain and good functional recovery.**[6]** Previous reports using cemented implants did not show good results, and osteonecrosis was often regarded as a poor prognostic indicator for cemented THA.**[7]** First-generation cementing techniques were used in these cases. Improving cementing techniques in patients with ON showed better clinical results,**[8]** but these results were still inferior to those of cementless prostheses.**[9]** This study included patients diagnosed with steroid-induced osteonecrosis of the femoral head studied prospectively. Patients were covered over a period of six months from the first of August 2020 to the end of January 2021. A sample of 18 patients was included. Female patients were more than males (55.6%) with a mean age of 36.39 years old. This study demonstrates that there is no significant difference between both groups as regarding socio-demographic data and this is consistent with Danielle Y. Ponzio et al (2019). **[10]** 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 in terms of pre and postoperative hip scores and improvements in the hip scores. The following conclusions can be made from these results. First, 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 **[11]** evaluated the influence of the aetiology of osteonecrosis on the results, and reported that the final functional outcomes were not influenced from the aetiology; 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% in the literature.**[12]** The infection rate for THA in steroid-induced osteonecrosis ranges from 1.3% to 19% in various studies.**[13]** In this study, the infection rate was 16.7%; this only represents 3 hips, and from our small sample size, it is difficult to draw 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.**[14]** In this study, the prevalence of periprosthetic fracture was 0%. Our sample size was too small to generalize or comment on the incidence of periprosthetic fracture among cementless fixation. In our study, we encountered 2 cases of dislocation. We can attribute this to liner breakdown in one case and weak abductors in the other case. In this study, we used a 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 the mild pain and limping that patient has.

CONCLUSION

Six months follow-up of total hip arthroplasty using cementless implants is fairly promisisng. The modified HHS increased dramatically. Combined with suitable indications, cementless implants ensure good clinical outcomes with minimal complications and a 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.

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