

# Outcomes of Unilateral Total Hip Arthroplasty in Patients Aged Under 35 Years in Iranian Population: A Preliminary Study

## Abstract

**Background:** The purpose of this study is to report outcomes of total hip arthroplasty (THA) in patients under the age of 35 years regarding pain and joint function. **Materials and Methods:** This preliminary analytic-descriptive study was performed in prospective consecutive series of forty-three patients younger than 35 years old who had undergone unilateral THA during a 36-month period. As the primary outcome, the severity of pain using visual analog scale (VAS) of 1–10, and as the secondary outcomes, joint range of motion (ROM) and the Harris Hip Score (HHS) were assessed in the preoperative visit, 1, 6, and 18 months after operation for each patient. Complications were recorded at 6 months and 18 months after surgery. **Results:** The data of VAS showed the mean severity of pain was significant between preoperation measurements and postoperative assessments ( $P < 0.001$ ). The means of HHS and hip ROM were also statistically significant before the operation in comparison with postoperative assessments ( $P < 0.001$  for both means). A total of 19 patients had postoperative complications including periprosthetic fracture in two patients, infection in two patients, cup loosening in three patients, limb length discrepancy in 10 patients, and heterotopic ossification in two patients. Seven patients had been readmitted. **Conclusion:** We believe THA using uncemented prosthesis has a high survivorship with low rate osteolysis in young patients with good bone stock. It is necessary to have longer follow-up to have a better evaluation on outcomes.

**Keywords:** Joint range of motion, severity of pain, total hip arthroplasty, uncemented prosthesis

## Introduction

In recent years, total hip replacement has attracted the attention of many researchers and physicians as the main option to restore joint function in various end-stage degenerative conditions of the hip joint.<sup>[1,2]</sup> Severe osteoarthritis (OA) as the most common reason include 70% of conditions resulted in total hip arthroplasty (THA).<sup>[3]</sup> However, some other conditions such as hip joint trauma and osteonecrosis can cause severe hip dysfunction and resulted in THA.<sup>[3]</sup>

THA is known as one of the important surgical treatments which improved efficacy and quality of life, especially in elderly patients. Some previous studies have documented the advantage of this procedure in younger populations.<sup>[4]</sup> High-tech medical diagnostic methods and effective treatment in the early phase of the underlying disease lead to obvious decrease in the number of young patients undergoing THA.<sup>[5]</sup> Because of long Life expectancy and rapidly

increased rate of young patients indicated for THA, the evaluation of surgical outcome is important to determine efficacy and quality of life. These assessments may be used to revise the surgical technique.<sup>[6,7]</sup> The previous published literature reported a 10-year survival rate ranging from about 50% to 95%.<sup>[6,7]</sup> In ninety presents of patients who were undergone the total hip replacement surgeries well by an expert surgeon, the pain is effectively decreased.<sup>[3]</sup> There are many factors which affect outcome of THA including skill of surgeon, mechanical properties of hip joint implant, body weight and body mass index of patients, age, and patient activity.<sup>[1-7]</sup>

The purpose of this study is to report outcomes of THA in patients under the age of 35 years regarding pain and joint function.

## Materials and Methods

### Participants and study design

Following Ethics Committee and the review board approval (Project No. 395103;

**How to cite this article:** Motifard M, Andalib A, Hamidi SJ, Badiei S. Outcomes of Unilateral Total Hip Arthroplasty in Patients Aged Under 35 Years in Iranian Population: A Preliminary Study. *Adv Biomed Res* 2018;7:63.

**Received:** April, 2017. **Accepted:** June, 2017.

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### Access this article online

**Website:** www.advbiores.net

**DOI:** 10.4103/abr.abr\_62\_17

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Ethics No. IR.MUI.REC.1394.3.103) and obtaining written informed consent from all patients at the beginning, this preliminary analytic-descriptive study was performed in prospective consecutive series of forty-three patients younger than 35 years old who had undergone unilateral THA during a 36-month period (March 2013–2016). Eligible patients were admitted to a university tertiary referral hospital. Nonprobability sampling was performed to select participants.

In this therapeutic study and as inclusion criteria, eligible patients were individuals with age under 35, who have indication for unilateral THA.<sup>[6]</sup> Exclusion criteria consisted of patients with a body mass index >35,<sup>[8]</sup> abnormal renal function tests (blood creatinine more than 1.5 mg/dl or creatinine clearance <60),<sup>[9]</sup> abnormal liver function tests,<sup>[9]</sup> known cases of myofascial pain syndromes and fibromyalgia,<sup>[9]</sup> spinal and neurological disorders especially radiculopathies and neuropathies, noncontrolled diabetes mellitus, previous major surgery in the same hip joint indicated for THA, those who were candidates for bilateral THA, and also patients who did not show up for the follow-up were also excluded from the study. Other medical disorders which do not effect on pain sensation were treated by other specialists. We used the American College of Rheumatology Preliminary Diagnostic Criteria for Fibromyalgia and Wolfe *et al.*'s study to rule out suspicious cases of myofascial pain syndromes and fibromyalgia.<sup>[10]</sup>

In our study, there were some disorders of the hip joint considered as indications for THA including arthritis (rheumatoid arthritis [RA], juvenile RA (still disease), ankylosing spondylitis), degenerative joint disease (e.g., hypertrophic OA), osteonecrosis (avascular necrosis), postfracture or dislocation, pyogenic arthritis or osteomyelitis (hematogenous, postoperative), tuberculosis, congenital subluxation or dislocation in hip joint and also hip fusion and pseudarthrosis, previous failed reconstruction, bone tumor involving proximal femur or acetabulum, hereditary disorders such as achondroplasia.

An orthopedic resident took a full history including previous activities, past medical problems, allergies, drug history, and psychological problems. In the preoperative visit, electro cardiogram and laboratory tests including hemoglobin, blood sugar, blood group and Rh, blood urea nitrogen, creatinine, alanine aminotransferase and aspartate aminotransferase, urine analysis, and urine culture were performed as well.

### Surgical technique and intervention

All surgeries were performed under spinal anesthesia with 10–15 mg of marcaine (bupivacaine) which was done by an anesthesiologist. One gram of intravenous cefazolin (EXIR®, Boroujerd, Iran) was administered

60 min before the surgery.<sup>[8]</sup> In patients who have a history of hypersensitivity reaction to penicillins or cephalosporins, we used 600 milligram of clindamycin (APOTEX®, Toronto, Ontario, Canada) instead.<sup>[11]</sup>

All operations were performed electively by a single-skilled orthopedic surgeon. All implants were uncemented total hip prosthetics (Zimmer®, Warsaw, IN, USA). After proper standard sterilization method<sup>[12]</sup> and through direct lateral approaches, all acetabular components were inserted using a standard press-fit technique and then adjunct acetabular screws were used to achieve initial mechanical stability of the acetabular component.<sup>[12]</sup>

At the end of the surgery, during soft tissue repairing, a low vacuum extra-articular drain was used which was removed 48 h after surgery.<sup>[8]</sup>

All patients were mobilized on the first day after surgery. For deep venous thrombosis prophylaxis, enoxaparin (Clexane® Pre-Filled Syringes Sanofi, Seine-Maritime, France) 60 mg SC was administered daily which continued for 14 days.<sup>[13]</sup> Patients were discharged if they had been mobilized and the wound was dry and clean. Immediately after the operation, the hip was positioned in 15° of abduction using a triangular pillow. All patients remained hospitalized when they were able to get in and out of bed.

A similar rehabilitation protocol was performed similarly before surgery, in immediate 24–48 h postoperative period in the hospital, 6 weeks and 6 months after surgery at home, except four patients who have been admitted due to trauma and were not able to begin rehabilitation before surgery. The most rehabilitation practices included strengthening abductors and stretching exercises. Patients were permitted to return work after 6 weeks.<sup>[12]</sup>

### Measurements and quantitative variables

Data, including basic patient demographic information, were collected in the preoperative visit and during hospitalization. The severity of pain by using visual analog scale (VAS) of 1-10 was assessed in the preoperative visit, 1, 6, and 18 months after the operation.<sup>[14]</sup> Joint range of motion (ROM) and the Harris Hip Score (HHS) were recorded before operation, 1 month, 6 months, and 18 months after operation for each patient. Complications were recorded at 6 months and 18 months after surgery.<sup>[13,15]</sup>

### Outcomes

The primary outcome of this study was the severity of the pain in the hip joint after surgery which was evaluated by one of the study investigators in the preoperative visit, 1, 6, and 18 months after the surgery. The secondary outcomes were functional parameters including ROM and HHS and complications documented at 1 month, 6 months, and 18 months after the surgery.

## Statistical analyses

Descriptive analysis was done to show the means and standard deviations, as well as maximum and minimum of the quantities. The quantitative variables had normal distributions. Sample *t*-tests were performed to compare quantitative variables between two genders before and after surgery (age, etiology of THA, complication). We used *t*-paired test and Wilcoxon matched for comparison of VAS, HSS, and ROM before and after surgery. *P* values were considered significant at amounts lower than 0.05 in the statistical analyses. The statistical analyses were performed using SPSS 23.0 (SPSS Inc, Armonk, NJ, USA) for Windows. The data are presented in mean  $\pm$  standard deviation.

## Results

In this study, 54 patients who were candidates for total hip replacement were assessed for inclusion criteria, and forty-three patients became eligible for this study. Four patients did not meet inclusion criteria, and seven patients declined to participate in the study.

In addition, no patients were excluded during the course of study. The mean age was  $31.2 \pm 2.9$  years. There were 24 men (55.80%) and 19 women (44.20%) in the study. The most common condition resulted in THA was avascular necrosis (osteonecrosis). Figure 1 presents the frequency of conditions led to THA.

The data of VAS showed the mean severity of pain was  $8.8 \pm 0.91$  while this mean were  $1.37 \pm 0.6$ ,  $0.71 \pm 0.33$ , and  $0.71 \pm 0.33$ , respectively, for 1 month, 6 months, and 18 months after surgery. Hence, there was a significant difference in severity of pain before and after surgery ( $P < 0.001$ ) [Figure 2].

The mean HSS before the operation, 1 month, 6 months, and 18 months after surgery was, respectively,  $81.45 \pm 6.35$ ,  $88.86 \pm 5.39$ , and  $91.26 \pm 4.75$  [Figure 3]. Hence, there was a significant difference in HSS before and after surgery ( $P < 0.001$ ).

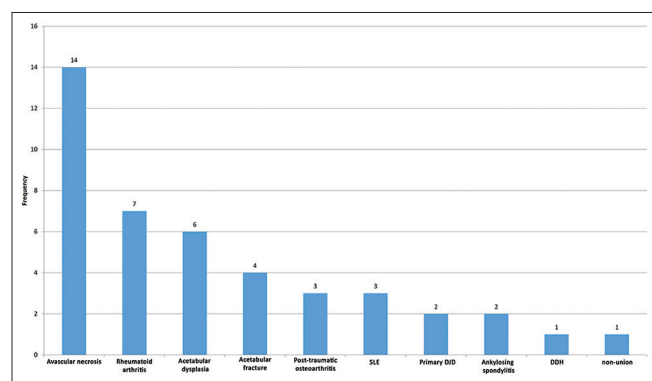


Figure 1: The frequency of different reasons resulted in total hip arthroplasty. SLE: Systemic lupus erythematosus, DJD: Degenerative joint disease, DDH: Developmental dysplasia of the hip

In Table 1, the mean hip ROM has been shown before and at one month, six months, and 18 months after surgery. Repeated analysis of variance of four parameters showed significant difference in hip joint ROM during the treatment period [Table 1].

In this study, nine patients (2/44%) had postoperative complications including periprosthetic fracture in two patients, infection in two patients, cup loosening in three cases, and heterotopic ossification in two case. Limb length discrepancy was also observed in some patients. The average amount of limb length discrepancy was  $1.31 \pm 0.38$  cm (range 1–2 cm). Seven patients (16.3%) had been readmitted.

## Discussion

The main finding of our study was the THA effectively decrease the severity of pain and patient satisfaction. The most important finding in our study is that total hip replacement has very low complication and high satisfaction especially among young patients. This study was done in a 36-month period, and patients were followed during 18 months.

Against the general candidates for THA who have average age of 65 years, the selection of treatment for young patients especially aged under 30 years sustained from end-stage hip disease is a greater challenge for orthopedic surgeon.<sup>[4]</sup>

The severity of postoperative pain is one of the main factors to assess the satisfaction of patients and quality of life.<sup>[16]</sup> Nam *et al.* showed better quality of life in surface hip replacement than THA.<sup>[8]</sup> It is important for clinicians to have a comprehensive pain assessment in patients undergoing THA.<sup>[17]</sup> In a study similar to us, Parvizi *et al.* reported the pain severity is lower in young individuals after primary THA with an uncemented femoral component than preoperative assessment.<sup>[18]</sup> Some previous studies also showed a good satisfaction after THA in young patients aged under 30 years.<sup>[14,19]</sup> In our study, the severity of pain was obviously relieved in short-term evaluation. The most decrease of pain severity was observed in patients who had

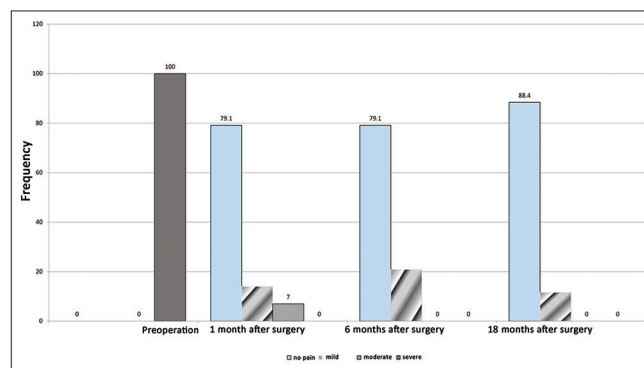
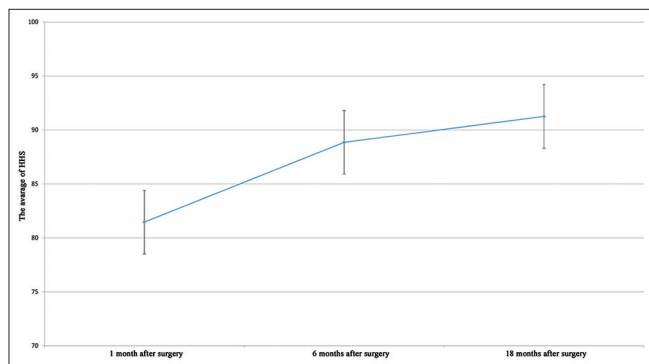


Figure 2: The frequency of pain severity at preoperative visit, 1, 6, and 18 months after surgery

**Table 1: The average of joint range of motion at preoperative visit, 1 month, 6 months, and 18 months after surgery**

Variable	Time*				P**
	Preoperation	1 month after operation	6 months after operation	18 months after operation	
Flexion	11.10±10.40	49.77±16.55	72.56±17.33	88.79±17.33	<0/001
Abduction	6.36±4.19	17.20±5.91	24.65±6.31	29.07±7.81	<0/001
Extension	5.45±4.19	16.51±6.50	20.47±6.53	26.28±6.18	<0/001
Adduction	5.26±3.33	13.10±5.17	16.43±5.17	20.71±4.63	<0/001

\*Variable is presented as mean±SD, \*\*P value is significant in lower amount of 0.05. SD: Standard deviation



**Figure 3: The mean Harris Hip Score 1, 6, and 18 months after surgery**

undergone THA due to avascular necrosis and then RA. The hip joint which is a crucial weight-bearing joint has a central role in the patient's daily activity and this study shows significant improvement in pain reduction and daily function and pain scores.

Joint ROM is the most important factor for quality of life after knee or hip replacement.<sup>[20]</sup> In younger patients, the role of activity as a marker of quality of life is becoming increasingly apparent.<sup>[20,21]</sup> HHS is a useful and variable system to assess hip joint function.<sup>[13,15]</sup> HHS may be increased after THA especially subsequent to inflammatory arthritis,<sup>[4,13,22]</sup> but the effect of THA on HHS is similar between young and old individuals.<sup>[13]</sup> In the current study, HHS was obviously raised 18 month after operation. Patient satisfaction and a quality of life were made better after THA in patients younger 35 years. The ROM improvement which is obtained through this operation directly correlates with function and patient satisfaction which is measured by HHS. It is difficult to achieve a good ROM especially in young patients, but it is obtained in our study as evidenced by our results.

In previous published studies, Juvenile RA was the most common indication for THA in the young population,<sup>[23,24]</sup> while in our study, avascular necrosis of femur head was the most common etiology resulted in THA.

Surgical complications is a main challenge for THA. Gerdesmeyer *et al.* evaluated long-term outcomes of cementless THA and showed the only complication was prosthetic loosening younger than 65 years.<sup>[25]</sup> Similar results were reported by Delaunay *et al.* and Kim *et al.*<sup>[16,26]</sup> THA using ceramic prosthesis is associated with high rate of survivorship.<sup>[16]</sup> Acceptable clinical score

after total hip replacement in young patients was revealed with lower implant survival in developmental dysplasia of the hip.<sup>[27]</sup> Walker *et al.* also reported a revision rate of 5% at 8.4 years in patient younger than 30 years after THA.<sup>[22]</sup> Kim *et al.* revealed well-fixed components without loosening and osteolysis with cementless THA in young patient at their follow-up.<sup>[26]</sup> In the current study, we observed the most complication was limb length discrepancy against the similar previous studies which showed loosening as the common complication. This operation is not done much in the geriatric population due to low survival rates; in such population and studies show low complication in the younger population, the most common being loosening of the joint. It is necessary for 2-year closed evaluation of loosening aspects and osteolysis.<sup>[6,14]</sup> Therefore, we could not measure the exact rate of these two parameters.

The main limitation of this study was short-term follow-up of patients. Other limitation was analgesic drugs injection required after operation. On the other hand, systemic diseases might affect the severity of pain or joint ROM.

## Conclusion

We believe THA using uncemented prosthesis may have a high survivorship with low rate osteolysis in young patients with good bone stock. We recommend that it is necessary to have longer follow-up to have a better evaluation on outcomes.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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