



Original Article

Effect of surgical treatment on the quality of life in patients with non-traumatic avascular necrosis of the femoral head[☆]



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ABSTRACT

Objective: Avascular necrosis of the hip is a common debilitating disease during the fourth and fifth decades of life. This study attempted to evaluate quality of life in patients with avascular necrosis of the hip joint before and after surgery.

Methods: In this study, 40 patients with avascular necrosis of the hip who underwent total hip arthroplasty, bipolar surgery, or cord compression were examined during 2006–2013. Harris Hip Score was used to assess the hip joint function and quality of life before and after surgery. The mean scores and standard deviation were used to describe data for quantitative variables, while frequency percentage was used to describe qualitative variables. Data were analyzed through SPSS v.19 and paired t-test. $p < 0.05$ was considered significant.

Results: This study involved 40 subjects with a mean age of 32 ± 7.38 years, ranging from 21 to 45 years old. The mean Harris Hip Score for patients before and after surgery were 20.36 and 96.15, respectively, showing a statistically significant difference ($p < 0.001$). The average patient activity scores before and after surgery (8.9 and 44.2, respectively), non-deformity (1.6 and 3.9), and movement (3.6 and 4.9) indicated significant differences ($p < 0.001$). Furthermore, 80% of patients felt no hip joint pain six months after surgery, while 92.5% patients did not use any assistive device to walk.

Conclusions: The results of this study demonstrated that surgery substantially contributed to relieving pain and improving hip function in patients with osteonecrosis of the hip joint in the short term.

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Efeito do tratamento cirúrgico sobre a qualidade de vida em pacientes com necrose avascular não traumática da cabeça femoral

R E S U M O

Palavras-chave:

Necrose da cabeça do fêmur
Artroplastia de quadril
Qualidade de vida

Objetivo: A necrose avascular do quadril é uma doença debilitante comum durante a quarta e quinta décadas de vida. O presente estudo tentou avaliar a qualidade de vida em pacientes com necrose avascular da articulação do quadril antes e após a cirurgia.

Métodos: Entre 2006 e 2013, o estudo avaliou 40 pacientes com necrose avascular do quadril que foram submetidos a artroplastia total do quadril, cirurgia bipolar ou descompressão do núcleo. O Harris Hip Score foi empregado para avaliar a função da articulação do quadril e a qualidade de vida antes e após a cirurgia. Os escores médios e o desvio padrão foram utilizados para descrever dados para variáveis quantitativas, enquanto a porcentagem de frequência foi usada para descrever variáveis qualitativas. Além disso, os dados foram analisados usando SPSS v.19 e o teste-t pareado. $p < 0,05$ foi considerado significativo.

Resultados: Este estudo envolveu 40 indivíduos com idade média de $32 \pm 7,38$ anos, variando de 21 a 45 anos. Os escores médios no Harris Hip Score para pacientes antes e após a cirurgia foram 20,36 e 96,15, respectivamente, apresentando diferença estatisticamente significativa ($p < 0,001$). Diferenças significativas ($p < 0,001$) foram observadas na atividade média do paciente antes e após a cirurgia (8,9 e 44,2, respectivamente), sem deformidade (1,6 e 3,9) e movimento (3,6 e 4,9). Além disso, 80% dos pacientes não sentiram dor nas articulações do quadril 6 meses após a cirurgia, enquanto 92,5% dos pacientes não usaram nenhum dispositivo auxiliar para deambulação.

Conclusões: Os resultados do presente estudo demonstraram que a cirurgia contribuiu substancialmente para aliviar a dor e melhorar a função do quadril em pacientes com osteonecrose da articulação do quadril a curto prazo.

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Introduction

Osteonecrosis, also known as avascular necrosis (AVN) of the femoral head, is a progressive disease that leads to the complete destruction of the hip if left untreated. There are various causes behind this multifactorial disease, but the main cause is unknown.¹

There are many theories about the mechanism behind the incidence of AVN. The proposed risk factors include chemotherapy, excessive steroid intake, alcoholism, post-traumatic injuries, caisson disease (decompression disease), vascular compression, high blood pressure, vasculitis, arterial embolism and thrombosis, rheumatoid arthritis, lupus, sickle cell anemia, Gaucher's Disease, radiation damage, and bisphosphonates, with some cases being idiopathic. While potentially affecting any bone, in half of cases AVN can be found in the shoulder, knee, and hip joints, more commonly in the last one.^{2,3} The peak prevalence of AVN occurs in 30–50 years of age. There are insufficient statistics on AVN prevalence, but estimates suggest that 10,000 to 20,000 new cases are diagnosed in the United States each year.^{4,5} This disease is increasing in Iran due to the ever-increasing instances of organ transplants and immune system diseases, where the course of treatment requires taking large amounts of corticosteroids.¹

A variety of methods are currently adopted to treat AVN, the most common being total hip replacement (THR). The long recovery period after surgery and its short life are among

negative aspects of THR. THR is an effective treatment procedure in the elderly population. Avascular necrosis is the most common cause of THR in Asia. Nonetheless, osteoarthritis is the most reason behind THR in Europe and America. A more promising new treatment is known as metal on metal (MOM) resurfacing.³ This method is a form of THR, even though the femoral head is only removed. It is therefore inconsistent with THR in which the entire femoral neck is removed. Other treatments include core decompression, where a hole is created by drilling in the bone head, mitigating pressure inside the bone. Moreover, an electrical device is implanted at the spot to stimulate the growth of new blood vessels.

There are relatively few studies specifically evaluating the change in health-related quality of life among patients with avascular necrosis undergoing total hip arthroplasty.⁶ This study was conducted to determine Effect of Surgical Treatment on the Quality of Life in Patients with Non-traumatic Avascular Necrosis (AVN) of Femoral Head.

Material and methods

The subjects of this study included all patients referred to Ilam Specialized Orthopedic Clinic (Iran), who were diagnosed with no traumatic avascular necrosis of the femoral head from October 2006 to September 2013. The study protocol (registration number: 91562) was approved by the Ethics Committee (Ethics Code EC/93/H/229). The disease was diagnosed in the

Table 1 – Harris Hip Score (HHS) questionnaire.

	Yes (1)	No (0)
Does your patient have fixed flexion of less than 30°?		
Does your patient have internal rotation of less than 10°?	"	"
Does your patient have fixed adduction of less than 10°?	"	"
Limb length difference less than 3.2 cm (1.5 inch)	"	"

subjects by an orthopedist through examination and paraclinical tests. Having submitted their written informed consent forms, the patients filled out a demographic questionnaire of personal information (age, gender, education, job records, history of diseases and comorbidities) (Table 1). In case of illiterate subjects, the questionnaire was completed by a well-trained interviewer (a nurse). The Harris Hip Score (HHS) questionnaire was employed to evaluate the hip joint function before and after surgery. The HHS questionnaire consists of three sections, the first of which asks the patient to answer questions about pain, lameness, ability to walk and to get up from/sit down on a chair, range of motion and limb length discrepancy, the scores in this section range from 0 to 100.⁷ This study involved scores of less than 70 (poor), 70–79 (average), 80–89 (good), 90–100 (excellent). The second section assesses the deformity of patients who are examined by a physician. In this section, a score of 4 is given by the physician when positive (yes) answers are given to all four items. Each item is assigned 1, otherwise, no score will be assigned.

In the third section of HHS, the physician specifies through physical examination the degrees of flexion, abduction, external rotation and adduction.

Once the patients completed the questionnaires, an orthopedist performed total hip arthroplasty, decompression or bipolar surgeries. After six months, the patients answered the questionnaire items and were examined again in the same procedure prior to surgery. After completing both questionnaires, the data were described through mean and standard deviation for quantitative variables and frequency percentage for qualitative variables. Moreover, data were analyzed through SPSS v.19 and paired t-test. $p < 0.05$ was considered significant.

Results

There were 40 subjects with a mean age of 32 ± 7.38 years ranging from 21 to 45 years of age. Moreover, 60% of patients were 26–40 years old, and 29 subjects (72.5%) were male. The maximum and minimum weights were 84 and 50 kg, respectively. The mean weight was 70.60 ± 8.20 kg and 50% of patients were 70 kg. The maximum height was 188 cm while the minimum height was 157 cm, averaging 172.80 ± 6.4 cm (Table 2). Moreover, 80% of patients had only one leg involved and 20% both legs. In this study, 55% of patients went under bipolar surgery, while 35% went under total hip arthroplasty (Table 3).

The mean value of results was 20.36 ± 14.26 before surgery and 96.15 ± 5.14 after surgery. The comparison of results before and after surgery indicated an increase in the mean value to 75.79 ± 15.77 after surgery (Table 4). The lowest score

Table 2 – Average of age, height and weight of the subjects.

	Age	Weight	Height
Average	32	70.6	172.8
SD	7.383	8.202	6.402
Number	40	40	40

Table 3 – Distribution frequency of type of surgery.

Type of operation	Frequency	Type of operation
CD	4	CD
THA	14	THA
Bipolar	22	Bipolar
Total	40	Total

in patients was 4.45 before surgery and the maximum score was 47.65. The lowest postoperative score was 83.85. Scores over 90 out of 100 were achieved by 77.5% of subjects, indicating a significant relationship between the results. The mean activity before and after surgery were 8.93 ± 8.05 and 44.28 ± 3.9 , respectively. The highest preoperative activity was ≥ 14 in 70% of patients. The lowest postoperative activity was 35, while it was ≥ 47 in 50% of patients. The comparison of preoperative and postoperative activities indicated an increase in the mean value to 35.35 ± 9.5 , where there was a significant relationship between the two categories. The mean pre- and post-operative deformities were 1.6 ± 74 and 3.95 ± 22 . Moreover, 52.5% of patients scored 2 to 4, while 95% scored ≥ 2 . The comparison of deformity before and after surgery indicated an increase in postoperative deformity by 2.35 ± 80 . Furthermore, 95% of patients achieved the maximum score (4) after surgery, indicating a significant relationship between the two categories. The mean movement before and after surgery were 3.61 ± 33 and 4.94 ± 07 . As for preoperative movement, 70% of patients scored ≥ 3.8 , while 65% of patients achieved the maximum score (5) after surgery. The comparison of preoperative and postoperative movement indicated an increase in the mean value by 1.32 ± 34 after surgery, indicating a significant relationship between the two categories.

Moreover, 47.5% of patients experienced completely debilitating, intense pain, crippling, and pain during bed rest before surgery, while all patients suffered at least moderate pain. After surgery, 80% of patients had no pain, while 20% reported small amounts of pain and occasionally during-activity pain. Furthermore, 37.5% of patients were unable to walk even on crutches preoperatively. After surgery, however, 92.5% did not use any assistive device and 7.5% used crutches only for long walks. 65% of patients experienced intense lameness before surgery, whereas 62.5% did not limp at all, and 37.5% had mild claudication.

77% of patients before surgery could hardly put on their socks and shoes. After surgery, however, 97.5% were easily able to do so. 50% of patients were preoperatively unable to use the stairs. After surgery, however, 100% could do so quite normally. 60% of patients were preoperatively unable to use the bus. After surgery, however, 100% could do so normally. 55% of patients were preoperatively unable to sit on a chair. After surgery, however, 100% could do so comfortably.

Table 4 – Comparing mean of activity, non-deformity, movement before and after surgery (paired t test).

	Mean and SD		Mean difference	p-value
	Before surgery	After surgery		
Activity	8.93 ± 8.1	44.28 ± 9.03	35.35 ± 9.5	0.001
Non-deformity	1.6 ± 0.74	3.95 ± 0.22	2.35 ± 0.8	0.001
Joint movement	3.61 ± 0.33	4.94 ± 0.07	1.33 ± 0.35	0.001
Mean of Harris Hip Score (HHS)	20.36 ± 14.26	96.15 ± 5.14	75.79 ± 15.77	0.001

45% of patients were preoperatively able to perform hip joint flexion by 60–70°, whereas 100% of patients were capable of Flexion ≤ 90° after surgery. 32% of patients were preoperatively able to perform hip abduction by 5–10°, whereas 100% of patients were capable of abduction between 15 to 20° after surgery. 55% of patients were preoperatively able to perform hip external rotation by 0–5°, whereas 100% of patients were capable of performing so by 10–15° after surgery. 5% of patients were preoperatively able to perform hip adduction by 0–5°, whereas 100% of patients were capable of performing so by 10–15° after surgery. Before surgery, 57% of patients were resting in bed, whereas 67% of patients walked without limitation, and 33% were able to walk about 30 minutes.

Discussion

Due to destruction of articular surfaces, patients with hip avascular necrosis suffer from joint dysfunction and subsequently become physically dysfunctional.⁸ The present study involved Harris Hip Score (HHS) as a well-known scale for assessing the hip joint function. In our study, the mean HHS of patients revealed that their hip joint function was 20.36 before surgery and 96.15 after surgery. Such improvement in joint function was statistically significant. Our results were consistent with those obtained by Madadi, who reported that the mean postoperative HHS was 94.⁹ Moreover, Mont et al.¹⁰ reported a mean preoperative score of 52. These values suggest the substantial disability, pain and reduced joint range of motion among patients. It is crucial to mitigate such disability through quick and fundamental measures.¹⁰

Since the HHS ranges from 0 to 100, the results of our study perfectly demonstrated that improvement of score from 20.36 preoperatively to 96.15 after surgery was quite satisfactory. In fact, a significant improvement was seen in the hip joint function of our patients. In another study, Heiberg classified the HHS into four categories of excellent (90–100), good (80–89), average (70–79) and poor (under 70).¹¹ In this study 100% of patients before surgery fell in the “poor” category, 87.5% in the “excellent” category and 12.5% in the “good” category based on HSS scale. In a similar study, however, Knahr reported that 97% of patients fell in the “poor” category before surgery, but 80.2% were excellent, 7.9% were average and 11.9% were poor after surgery. These results are consistent with Knahr’s in terms of surgical success rate. The results obtained by Knahr et al.¹² demonstrated the difference between quality of life before and after prosthetic implantation among patients with avascular necrosis. It was concluded that patient’s quality of life should be evaluated through objective assessment based on HHS scale as well as subjective assessment of patients

including their feelings prior to making any interpretation of medication results from treatment procedures.

The results of our study suggested that the mean HHS achieved by patients was poor (20.36) before surgery, but it improved to excellent (96.15) after surgery. In other words, it can be argued that postoperative hip function was excellent in patients. In their own studies, Edmonds and Boscainos¹³; Sander et al.¹⁴ separately reported an increase in HHS after total hip arthroplasty and improvement of hip function after the procedure. In their study, Peters et al.¹⁵ pointed out that long-term results of surgical treatment for avascular necrosis was accompanied by sustaining joints in most patients with reduced quality of life due to pain and lower ability to perform daily activities.

Towheed et al.⁶ specifically assessed changes in health-related quality of life (QOL) among patients with avascular necrosis undergoing total hip arthroplasty (THR). The results suggested that useful and often dramatic improvements were achieved in QOL, most likely over the first 3 to 6 months after THR.⁶ In their study, Mariconda et al.¹⁶ examined 250 patients who underwent total hip arthroplasty for 16 years. At the end, they argued that that patients’ quality of life and hip function dramatically improved.

Our findings suggested that most patients under study (72.5%) were male, and the mean age of patients was 32 years. This study was consistent with that conducted by Madadi. This age range and gender superiority was similar to previous studies, falling within the epidemiological age and gender range of avascular necrosis.¹⁶

Conclusions

Generally, the results of this study and those of previous similar studies indicated that surgical intervention (total hip replacement, cord compression, bipolar) remarkably contributed to short-term outcomes in patients with osteonecrosis. Apparently, this treatment procedure promoted the functional status of patients to a desirable level. Nevertheless, any definitive judgment on the long-term effects and complications over following postoperative years requires in-depth investigation and a longer course of observation. This is all the more important considering that most patients with osteonecrosis are young and are going to live for many years following the surgery.

Conflicts of interest

The authors declare no conflicts of interest.

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