



The Early Gain of Function and Quality of Life Afier Primary Hip Arthroplasty (July 2021-June 2022)

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Abstract

Introduction: Primary total hip arthroplasty has increasingly been performed recently in many centres in Sudan. Patients are concerned mainly with the early return of function afier being handicapped by severe pain from their arthritic hip.

Objectives: To determine the gain of function and quality of life six weeks afier primary total hip arthroplasty (THA).

Methodology: This is a descriptive, prospective hospital-based study which was conducted in Sharg Alneel Hospital in Khartoum north of Sudan. We included all patients who underwent primary total hip arthroplasty during the period from July 2019 to June 2020. We used the Harris hip score (HHS) to describe the changes in hip function and quality of life between preoperative and six weeks afier primary total hip arthroplasty.

Results: Forty patients were involved in this study, their ages ranged from 58-80 years with a mean age of 68.63 ± 5.94 SD. Seventeen patients (42.5%) were males and 23 (57.5%) were females. Thirty-five (87.5%) had primary osteoarthritis and five patients (12.5%) had avascular necrosis of the head of the femur. HHS Score was improved from 38 points (25-55) pre-operatively to 75 points (59-89) post-operatively (P value <0.0001). Eight patients (20%) had poor scores (<70), 23 patients (57.5%) had fair scores (70-80) nine patients had good scores (80-90) and no patients had excellent scores (90-100). Younger patients (<69 years) scored higher HHS than older (≥ 69) patients and this correlation was statistically significant (P value 0.009). Using HHS pain score improved significantly from 13.5 ± 4.8 SD pre-operatively to 41.2 ± 3.3 SD post-operatively (P value <0.0001). Function score also improved from 18.6 ± 4.4 SD pre-operatively to 26.2 ± 5 SD and our result was statistically significant (P value <0.0001). Moreover, the absence of deformity score improved from 3.5 ± 1.3 to 4 SD (P value 0.023). And the range of motion scores improved from $2.76 \pm .6$ SD pre-operatively to $3.76 \pm .3$ SD post-operatively (P value <0.0001).

Conclusion: Eighty per cent of our patients had fair to good results and the age of ≥ 69 years was significantly associated with poor scores post-operatively.

Keywords: Total Hip Arthroplasty (THA); Osteoarthritis (OA)

Introduction

The most common cause of pain and disability in the elderly is osteoarthritis (OA) [1]. One's ability to carry out daily tasks and take part in social, professional, and recreational activities is restricted by the physical impairments linked to osteoarthritis (OA) [2]. As a result, individuals with OA engage in less physical activity

than those without [3], and the majority do not reach the physical activity recommendations suggested for maintaining good health [4].

One of the most popular and successful surgeries in the world, total hip arthroplasty (THA) has been dubbed the "operation of the century" [5] and has been the go-to treatment for severe hip arthritis and osteonecrosis for the past few decades [6].

Harris Hip Score (HHS) is a validated and the most commonly used tool to measure the functional capacity of an individual before and after a surgical procedure [7].

Methodology

This is a descriptive, prospective, hospital-based study to determine the hip function and quality of life before and six weeks after primary total hip arthroplasty at Sharg Alneel Hospital (SAH) in Khartoum north of Sudan from July 2021 to June 2022. All 40 patients were >55 years who underwent primary total hip arthroplasty at Sharg Alneel Hospital during the study period.

Data were obtained from all patients pre-operatively in the ward one day before the operation and six weeks (40-45 days) after the operation in the outpatient department using a data sheet by the researcher who is a well-trained registrar and was analyzed by the Statistical Package for the Social Sciences (SPSS) version 20. The data sheet contains demographic data, indications for operations and Harris hip score. Two-tailed paired sample t-test and Chi-square test were used to compare the variables with a Confidence interval of >95% and a P value less than 0.05 which was considered significant. Ethical clearance from the ethical committee of the Sudan Medical Specialization Board (SMSB) was obtained and permission was taken from the hospital authority. Written informed Consents were obtained from all patients.

Harris Hip score components are Pain 44 points, Function 47 points, Absence of deformities 4 points and Range of motion 5 points. with a total of 100 points (range 0–100 points). The score is considered poor if (<70), fair if (70–80), good if (80–90), and excellent if (90–100).

Inclusion criteria

All Patients were >55 years who underwent primary total hip arthroplasty at Sharg Alneel Hospital.

Exclusion criteria

Patients for revision THR.

Patients with Rheumatoid arthritis or Stroke patients. The patient ages less than 55 years.

Surgical technique

All patients were operated in the arthroplasty unit in Sharg Alneel Hospital. Patients were operated on for primary THA. Patients were positioned in a lateral position through Hardinge's Approach with the operated leg flexed to about 30 degrees.

After the standard aseptic precautions were taken, a lateral skin incision centred over the greater trochanter was done four fingers proximal and four fingers distal to it, the subcutaneous fat and fascia lata were opened, and then the greater trochanteric bursa were dissected. Then fibres of gluteus medius and vastus lateralis were identified, and a deeper incision was performed at the tendinous part of the gluteus medius at the junction of the anterior one-third and the posterior two-third, taking into consideration not to extend more than 5cm proximal to the tip of the greater trochanter to avoid injury to the superior gluteal nerve, distal extension in line with fibres of vastus lateralis at sub-periosteal manner, and he assistant did an external rotation simultaneously. Then gluteus minimus was identified and its capsule was opened in a T-shaped manner after that the femoral head was identified and dislocated with external rotation.

Patients were given antibiotics, conventional analgesia +/- opioid and thrombo-prophylaxis post-operatively. Early mobilization with weight bearing as tolerated was done from day one. All patients received a photographic hospital manual with instructions that demonstrated the positions to be avoided, knees and hips exercises and how to use the operated leg in daily activities. Most patients were discharged at day 3 post-operatively (3-4 days). Then they were given an appointment for suture removal after 2 weeks (10–14 days) and another one 4 weeks after that (six weeks from the operation).

Results

Forty patients were involved in this study. All have undergone primary hip arthroplasty due to hip osteoarthritis. Age ranged from 58 to 80 years with a mean age of 68.63 ± 5.94 SD. Seventeen patients (42.5%) were males and 23 (57.5%) were females. Regarding pre-operative diagnosis, 35 patients (87.5%) were diagnosed with primary hip osteoarthritis and five patients (12.5%) were diagnosed to have avascular necrosis of the head of the femur.

Our patient's HHS was improved from 38 (25-55) pre-operatively to 75 (59-89) SD post-operatively (P. value <.0001). Eight patients (20%) had poor scores (<70), 23 patients (57.5%) had fair scores (70-80), nine patients had good scores (80-90) and no patients had excellent scores (90-100) (Table 1).

Younger patients in our study (<69 years) scored higher HHS than relatively older (≥ 69 years) patients. The correlation between the two age groups and their HHS was statistically significant. (P value 0.009).

	Poor (< 70 points)	Fair (70-80)	Good (80-90)	Excellent (90-100)
58 - 68 years	0	13	6	0
69 - 80 years	8	0	3	0
Total	8	23	9	0

Table 1: Correlations between patients' age & HHS score.

Pain score using HHS for our patients was 27 patients scored 10 (marked pain), and 13 patients scored 20 (moderate) preoperatively with a mean score of 13.5 ± 4.8 SD. The pain score six weeks afier surgery was three patients scored 30 (mild), 20 patients scored 40 (slight) and 17 patients scored 44 (no pain) with a mean pain score of 41.2 ± 3.3 SD post-operatively, our results were statistically significant (P value <0.0001).

Regarding limping score preoperatively one patient (2.5%) scored zero (severe limp), 37 patients (92.5%) scored five (moderate limp) and two patients (5%) scored eight (mild limp). The mean preoperative limping score was 5.02 ± 1.05 SD. Limping score postoperatively was 10 patients (25%) scored five (moderate limp), one patient (2.5%) scored 11 (no limp) and 29 patients (72.5%) scored eight (mild limp). The mean post-operative limping score was 7.3 ± 1.4 SD.

Using support scores pre-operatively five patients (12.5%) scored zero (crutches walker or Unable to walk), seven patients (17.5%) scored five (using one crutch) and 28 patients (70%) scored five (Cane most of the time). The mean pre-operative using support score was 4.2 ± 1.65 SD. Using support scores post-operatively 10 patients (25%) scored zero (two crutches walker or unable to walk), 15 patients (37.5%) scored five (cane most of the time) and 14 patients (35%) scored seven (cane for long walks), one patient (2.5%) scored 11 (no support). The mean postoperative using support score was 4.6 ± 2.9 SD.

Distance walked scores pre-operatively 16 patients (40%) scored two (Indoors only), 23 patients (57.5%) scored five (Two to three blocks) and one patient (2.5%) scored eight (Six blocks). The mean pre-operative distance walked score was 3.9 ± 1.6 SD. Distance walked scores post-operatively three patients (7.5%) scored two (Indoors only), 31patients (77.5%) scored five (Two to three blocks) and five patients (12.5%) scored eight (Six blocks) and one patient (2.5%) scored 11 (Unlimited). The mean postoperative distance walked score was 5.3 ± 1.6 SD.

Total gait score (limping score, using support and distance walked) was improved from 13.1 ± 2.8 SD pre-operatively to 17.1 ± 4.4 SD post-operatively, our result was statistically significant. (P value <0.0001).

Using stairs scores pre-operatively 15 patients (37.5%) scored zero (unable to do stairs), and 25 patients (62.5%) scored two (foot over foot use bannister). The mean pre-operative using stairs scores was 1.25 ± 1 SD. Using stairs scores post-operatively three patients (7.5%) scored zero (unable to do stair), 32 patients (80%) scored two (foot over foot use banister) and five patients (12.5%) scored four (foot over foot without use banister). The mean postoperative using stairs scores was 2.1 ± 0.9 SD.

Tying shoes and wearing socks pre-operatively 13 patients (32.5%) scored zero (unable), and 27 patients (67.5%) scored two (with difficulty). The mean pre-operative using stairs scores was 1.35 ± 0.9 SD. Tying shoes and wearing post-operatively three patients (7.5%) scored zero (unable to wear shoes), and 10 patients (25%) scored two (with difficulty). 10 patients (25%) scored two (two to three blocks) and 27 patients (67.5%) scored four (with ease). The mean postoperative using stairs scores was 3.2 ± 1.3 SD.

Pre-operatively in sitting assessment six patients (15%) scored zero (unable to sit comfortably in any chair), 30 patients (75%) scored three (on a highchair, one to half an hour) and four (10%) patients scored five (comfortably in an ordinary chair, one hour). The mean pre-operative sitting score was 2.75 ± 1.3 SD. Post-operatively in sitting assessment 34 patients (85%) scored three (on a high chair, one to half an hour) and six (15%) patients scored five (comfortably in ordinary chair, one hour). The mean post-operative sitting score was 3.3 ± 0.7 SD.

Pre-operatively our assessment for entering public transportation assessment 26 patients (65%) scored zero (they can't) and 14 patients (35%) scored one (they can) with a mean score of 0.35 ± 0.48 SD. Post-operatively our assessment for entering public trans-

portation assessment 23 patients (57.5%) scored zero (they can't) and 17 patients (42.5%) scored one (they can) with a mean score of 0.35 ± 0.48 SD.

Total functional activities (using stairs, wearing socks and shoes, sitting and entering public transportation) score improved

from 5.7 ± 2.1 SD to 9.5 ± 1.7 SD, our result was statistically significant. (P value <0001).

The total function score (gait and functional activities) was improved from a mean score of 18.6 ± 4.4 SD pre-operatively to 26.2 ± 5 SD post-operatively, our result was statistically significant. (P value <0001) (Table 2).

	Mean score	Standard deviation	Range	p. value
Gait preoperative	13.1	2.8	7-18	.000
Gait post-operative	17.1	4.4	7-27	
Function activities preoperative	5.7	2.2	3-10	.000
Function activities post-operative	9.05	1.7	5-12	
Total Function Preoperative	18.85	4.4	10-28	.000
Total Function post-operative	26.2	5	12-38	

Table 2: Correlation between pre-operative and post-operative functional scores.

We found in our patients that absence of deformity score pre-operatively as five patients (12.5%) were had fixed internal rotation in extension <10, one patient (2.5) had fixed flexion contracture < 30, and no patient had fixed adduction < 10 or leg length discrepancy less than 3.2 cm. Post-operatively no deformity was noted, and the total absence of deformity score was improved from 3.5 ± 1.3 to 4 SD, our result was statistically significant. (P value .023).

Regarding range of motion scores, flexion was improved from 2.1 ± 0.5 SD to 2.8 ± 0.25 SD post-operatively, abduction changed from 0.33 ± 0.13 SD to 0.6 ± 0.09 SD, adduction was changed from 0.1 ± 0.3 SD to 0.13 ± 0.02 SD and external rotation from 0.2 ± 0.7 SD to 0.21 ± 0.09 SD. The total range of motion score was improved from 2.76 ± 0.6 SD pre-operatively to 3.76 ± 0.3 SD post-operatively, and our result was statistically significant (P value <.0001).

Discussion

Forty patients were involved in this study. All have undergone primary hip arthroplasty due to hip osteoarthritis. Their age ranged from 58 to 80 years with mean age of 68.63 ± 5.94 SD. Seventeen patients (42.5%) were males and 23 (57.5%) were females. The indication of operation was primary osteoarthritis in 35 patients (87.5%) and AVN of the head of the femur in five patients (12.5%). Our study was done in Sharg-Alneel Hospital and aimed to assess the early gain of function afier primary hip arthroplasty.

H L Hoeksma., *et al.* investigated 75 patients with hip osteoarthritis who had undergone primary THA, their patient's mean age

was 72 years, and 55 patients (73%) were females. Their patients' age and female predominance were similar to patients in our study [8]. LUKE OGONDA., *et al.* analyzed 219 patients to whom they underwent primary THA with a mean age of 66.6 years 51.1% were females 97.7% their indication was hip osteoarthritis and 1% was due to AVN [9].

Lisette C M KLAPWIJK., *et al.* studied 94 patients who underwent primary THA with a mean age of 65 years, 55 patients (59.6%) were females which is similar to our study [10]. The predominance of hip osteoarthritis in these age groups and female predominance in our study and the above-mentioned ones may be explained by a study which was done by Muraki S., *et al.* they prospectively followed 745 Japanese men and 1470 Japanese women for 3 years, which revealed that age greater than 60 years is an important risk factor for radiographic OA [11]. Felson DT., *et al.* also found that women have the highest prevalence of hip OA afier age 50 years, some authors attribute these findings to post-menopausal changes [12,13].

Our patient's mean pain score was 13.5 points pre-operatively, Prabhulingreddy Patil., *et al.* found a pre-operative score of 12.22 points which is similar to our study [14]. Cale A. Jacobs and Christian P. Christensen found a score of 11.2 points which is closer to our result [15].

Our patient's post-operative mean pain score was 41.2 at six weeks follow-up, Jon H M Goosen., *et al.* found a mean score of 40 which is similar to our result [16]. Cale A. Jacobs and Christian P.

Christensen found a closer result with a score of 37.65 points six weeks post-operatively [15].

With regards to function score pre-operatively we found a mean gait score of 13.1 points, functional activities of 5.7 and total score of 18.6 points pre-operatively, our pre-operative functional score was similar to the findings of Prabhulingreddy Patil., *et al.* as they found gait score of 11.17, functional activities of 5 and total score of 16.17 (P value <0.0001) [14]. Swarn Gupta., *et al.* found a pre-operative gait score was 20.72 functional activities of 4.14 and a total score of 24.86 points, their pre-operative total function and gait score was higher than our findings may be because they investigated younger patients (40.5 years) and their main indications for THA was AVN (72%) [17].

Our patients' mean post-operative functional score was 17.1 for gait and 9.5 for functional activities with a total functional score of 26.2 points post-operatively. W.-C. Witzleb., *et al.* found a total function score of 24 points which is similar to our study [18]. Cale A. Jacobs and Christian P. Christensen studied 114 patients they found a score of 22.3 points six weeks afier THA (P value 0.04) which is slightly inferior to our result may be because they included 7 patients (6.1%) with NOF fracture [15].

In our study the absence of deformity score for our patients was 3.5 pre-operatively and 4 six weeks post-operatively. Swarn Gupta., *et al.* for their study in India included 500 patients they found a pre-operative score of 3.36 and a post-operative score of 4 as early as 4 weeks (P value <0.001) their results were similar to our study [17]. Prabhulingreddy Patil., *et al.* studied 36 patients they found a pre-operative score of 3.78 and a post-operative score of 4 (only 2 patients were six weeks and they scored 4) which is similar to our study [14].

In our study, our patients' ROM score pre-operatively was 2.76 points using HHS, and a post-operative score of 3.76 after six weeks. A study done in Egypt by Ahmed SH. Rizk., *et al.* studied 40 patients with a mean age of 33 years with different indications before and afier primary THA using different head sizes of ceramic on ceramic implants they found a mean pre-operative score of 2.1 and a mean score of 3 at six weeks post-operatively, their pre-operative and post-operative scores are slightly inferior to our patients may be because they included different indications not included in our study (7 cases of ankylosing spondylitis and 6 cases of systemic lupus erythematosus) [19]. Another study done in India by Swarn Gupta., *et al.* analyzed 500 patients whose main indication was AVN

(72%), with a mean age of 40 years they found a pre-operative score of 2.96 (P value <0.001) which is similar to our result [17].

In our study, HHS pre-operatively was 38 points and 75 points post-operatively. Sven Kili., *et al.* analyzed 167 patients who were booked for primary THA and they found a pre-operative score of 42.1 which was similar to our pre-operative results [20]. Brian E., *et al.* analyzed their patients afier THA using HHS and they found a score of 75 six weeks afier their operation which is similar to our results [21]. Jon H M Goosen., *et al.* studied 100 patients afier THA with similar indications in our study, but their patient's mean age was younger (51 years) and scored 78 points which is closer to our results [16].

In our study, we found patients with an age of more than 68 years achieved a relatively lower score. Our results can be explained by Max Gordon., *et al.* who analyzed more than 27 thousand patients and found lower functional scores in patients in their late sixties [22]. A-K. Nilsdotter., *et al.* analyzed 148 patients with primary hip arthroplasty before and afier primary hip arthroplasty, they concluded that younger patients gained more function post-operatively than older patients and At least 1 year is required for the average OA patient to gain the full benefit of the THR, their cut off point was 72 years. These findings may explain ours [23].

Conclusion

In conclusion, total hip arthroplasty showed better pain relief and short-term functional outcomes in our patients using HHS. HHS changed from 38 (25-55) pre-operatively to 75 (59-89) post-operatively. Our result was statistically significant. (P value <0.0001).

Age of 69 years and more associated with a relatively lower score post-operatively. This association were found to be statistically significant. (P value 0.009).

Recommendations

We recommend further studies measuring the outcome in the long term with a bigger sample size.

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Ethics approval and consent to participate.

We declare that we have:

- Written ethical clearance and approval for conducting this research obtained from the Sudan Medical Specialization Board Ethical Committee and by (EDC)
- Written permission was obtained from the administrative authority of Sharg Alneel Hospital (SAH)
- Confidentiality was considered intentional, data was used anonymously by using code Numbers instead of names to participants' identities and keep secure, and information Was used for research purposes only.

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Competing Interests

The authors declare that they have no competing Interests.

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Author Contribution

- M.k: Orthopedic surgeon, Resources, Visualization, Validation, assist in analysis and editing.
- B.M: Orthopedic surgeon, Conceptualization, Methodology, Resources, Project Administration, Writing original draf
- S.M: Orthopedic surgeon, Data curation, Resources, Validation, review and editing.
- A.Y: Medical officer, Data collection, Conceptualization, Methodology, assist in Writing original draf
- D.S: Medical Student, Data Curation, Formal Analysis, Software, assist in Writing Original draf.

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