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Evaluation of Functional Hip Score after Total Hip Replacement in Cases of Bilateral Fused Hips: A Case Series Study

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ABSTRACT

Background: Rheumatological diseases can severely impair mobility and workability, with hip fusion being a significant complication. Bilateral total hip arthroplasty (THA) is often the last resort for these patients, yet its role in treating bilateral fused hips has been minimally explored in the literature.

Objective: To evaluate the clinical outcomes of bilateral THA in patients from a low-income setting with bilateral hip fusion.

Patients and Methods: This retrospective case series involved 16 patients with bilateral fused hips and some degree of mobility. Exclusion criteria included active infection or debilitating diseases. All patients underwent weight-bearing X-rays and subsequent bilateral THA using patient-specific instrumentation (PSI). Outcomes assessed included the Harris Hip Score (HHS), range of motion (ROM), pain in the hips, knees, and lower back, and leg length discrepancy.

Results: The study included 16 patients (seven females), with an average age of 39.0 years (SD = 15.9). The most common causes of fused hips were rheumatoid arthritis and avascular necrosis (25% each). Significant improvements were observed postoperatively in HHS, ROM, hip and knee pain, lower back pain, hip deformity, and leg length discrepancy ($p<0.05$). Two patients experienced minor postoperative complications, which resolved.

Conclusion: Bilateral THA is a viable option for bilateral fused hips regardless of the etiology, sex, or age of participants.

Keywords: Bilateral fused hips; Total hip arthroplasty; Functional hip score; Harris hip score.

INTRODUCTION

Hip and knee osteoarthritis are two of the major medical concerns as they influence walkability and workability of the affected individuals. The incidence of osteoarthritis is variable; however, it was reported to be affecting 48% of worldwide population [1]. In 2019, osteoarthritis caused 128.5 (63.5 – 257.2) disability-adjusted life years (DALYs) per 100,000 Egyptians, which translates to 0.48% (0.25% – 0.96%) of the total DALYs measured that year [2]. A consequence of this high burden is the increased risk of complications that include hip joint fusion [3].

One of the solutions to fused hips is the performance of hip, otherwise, ankylosis will eventually occur. In the case of the latter, this usually follows an infection. Arthrodesis has diminished in favor largely due to improved fixation procedures and the enormous success of total hip arthroplasty (THA) [4]. Hip arthrodesis was and may still be considered in several circumstances. This includes substantial femoral or pelvic deformity that prevents THA, neurological disorders with a high risk of dislocation, and a greater chance of THA failure in a very young patient group [5-8]. However, the surgeon is more likely to encounter a patient who requests conversion to THA.

Hip discomfort, back pain, and ipsilateral knee pain are the most typical indicators. Occasionally, the patient will want conversion due to difficulties with daily living activities, body image, and perceived cosmoses [9].

The main advantages of converting arthrodesis to THA are the restoration of joint motion and function, as well as the associated improvements in quality of life, with conversion generally indicated for patients suffering from arthrodesis-related low back pain, ipsilateral knee or contralateral hip pain, unfavorable joint alignment, or non-fusion [10,11].

Conversion to THA, on the other hand, introduces various obstacles. Correcting leg length discrepancy (LLD) and reaming the acetabulum for proper acetabular component alignment are particularly difficult due to the altered bone and soft tissue architecture seen in arthrodesis as well as muscle atrophy and general weakness of nearby muscles [12].

In the literature, the topic of treating bilateral fused hips with bilateral THA is understudied. Therefore, in this study, we aimed to highlight the clinical outcomes of bilateral THA in patients with bilateral hip fusion before and after surgery, especially the following outcomes: functional hip score (Harris hip score), range of motion, hip pain, knee pain, low back pain, limb length discrepancy, hip deformity, and complications.

PATIENTS AND METHODS

Study design

This is a retrospective case series study that was conducted in the Orthopedic Department at the Faculty of Medicine, October 6 University. The reporting of this study was checked against the 2020 version of the Preferred Reporting of CasE Series in Surgery [13].

Ethical considerations

Ethical approval was obtained from the Ethical Committee of the October 6 University Hospital before conducting the data collection. All participants signed informed consent as a routine

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procedure before each operation. The informed consent contained agreeing to the usage of data in the synthesis of research papers and their publication. All participants were counseled regarding the possible complications of the operation, such as wound bleeding, bleeding complications, nerve or neurovascular injuries, infections, scar formation, stiffness, implant problems, allergic reactions, and persistent pain. Participants were free to opt-out at any time, even after the completion of the procedure. The Helsinki Declaration was followed throughout the study's conduct.

Lastly, all authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge, or beliefs) in the subject matter or materials discussed in this manuscript.

Participants

We finally included 16 patients with 32 fused hips.

Inclusion criteria included patients with symptomatic bilateral fused hips. However, participants must have been mobile with no movement limitations.

Exclusion criteria included patients with active infection, asymptomatic patients with fused hips, patients with unilateral hip affection, patients with general debilitating disease that may affect general surgical outcomes (for example, uncontrolled heart failure), and patients suffering from neuromuscular disorders that contradict a hip arthroplasty surgery.

All patients were recruited from the Egyptian Community Arthroplasty Register (ECAR) [14].

History taking and clinical examination were properly done for all patients to ensure that they were applicable to receive THA.

Data collection

The data collected included basic demographics (like, age in years, sex, weight in Kg, height in cm), preoperative data (such as, preoperative functional hip score), and postoperative data (for instance, postoperative functional hip score). All patients have undergone weight-bearing X-rays of both hips using the anteroposterior and lateral views.

Postoperative care

All the patients had rehabilitation immediately after surgery for stiffness prevention. The spinal epidural anesthesia was given for two days after surgery for pain management. All patients stayed at the hospital for two or three days postoperatively. All patients were discharged and prescribed antibiotics and anti-coagulants for prophylaxis for two weeks and were scheduled for a follow-up appointment at the clinic after six weeks and then after six months.

Outcome variables

The outcomes of this study included the functional hip score (Harris hip score), range of motion, hip pain, knee pain, low back pain, limb length discrepancy, hip deformity, and postoperative complications.

Statistical analysis

The collected data were introduced and statistically analyzed by utilizing the Statistical Package for the Social Sciences (SPSS) version 20 for windows. Qualitative data were defined as numbers and percentages and were compared by Chi-Squared test. Quantitative data were tested for normality by Kolmogorov-Smirnov test. They were described as mean, standard deviation (SD), and range and independent sample t-test/Paired t-test were used for the comparison between groups. A p-value ≤ 0.05 was statistically significant for having a difference between the two groups.

RESULTS

The total number of patients included in the patients was sixteen, with 32 bilateral fused hips. Seven of the sixteen patients were females. The average age of all patients was 39.0 with SD of 15.9 (Table 1). Fourteen of the thirty-two hips were for females. The laterality of the affected hips was evenly distributed between the right and left sides (Table 2).

Table 1. The basic characteristics of the studied patients.

		Total number of patients (N) = 16
Age (years)	**Mean (SD)**	39.0 (15.9)
	Range	21 – 69
Sex of participants	**Male**	9 (56%)
	Female	7 (44%)

Table 2. The basic characteristics of the studied hips.

		Total number of hips (N) = 32
Number of hips according to the sex of participants	**Male**	18 (56%)
	Female	14 (44%)
Laterality	**Right**	16 (50%)
	Left	16 (50%)

The most common indications for THA were avascular necrosis of the hip and rheumatoid arthritis which comprised 25% of the cases each (Table 3).

Table 3. The indications for THA in the included hips.

	Total	Male	Female	P-value
Ankylosing spondylitis	6 (19%)	6 (33%)	0 (0%)	0.013*
Avascular necrosis of the hip	8 (25%)	6 (33%)	2 (14%)	
Protruding concentric arthritis	2 (6%)	0 (0%)	2 (14%)	
Osteoarthritis	6 (19%)	4 (22%)	2 (14%)	
Osteoarthritis with DDH	2 (6%)	0 (0%)	2 (14%)	
Rheumatoid arthritis	8 (25%)	2 (11%)	6 (43%)	

*: Statistically significant.

Harris hip score

For the whole sample, the mean Harris hip score increased significantly postoperatively compared to preoperative value. Noteworthy is that the postoperative Harris hip score ranged from 78.7 to 92.9, indicating some variation between some operated hips in our sample (Table 4).

Postoperative hip range of motion (ROM)

Regarding the outcomes of interest, all candidates had limited or no range of motion preoperatively. However, after the operation, all candidates restored normal ROM. Comparing the preoperative and postoperative improvement, the difference was statistically significant (Table 4).

Hip pain

Using qualitative pain assessment, all patients had chronic severe pain preoperatively. Postoperatively, eighteen hips reported no pain (56%) while the rest of the fourteen hips only reported mild pain (44%). There was statistically significant difference between pre- and postoperative hip pain (Table 4).

Knee pain

There was statistically significant difference between pre- and postoperative knee pain (Table 4).

Low back pain

Similar findings were observed in low back pain. There was statistically significant difference between pre- and postoperative low back pain (Table 4).

Limb length discrepancy

No limb length discrepancy was reported in all limbs postoperatively (Table 4).

Hip deformity

All patients had at least one form of hip deformity preoperatively. The most common hip deformity was flexion deformity (63%). Postoperatively, no hip had deformity (Table 4).

Table 4. The study outcomes including preoperative and postoperative measurements.

	Total	Male	Female	P-value
Preoperative HHS				
Mean (SD)	32.2 (2.5)	32.9 (1.2)	31.3 (3.3)	0.066
Range	25.7 to 35.7	31.5 to 35.7	25.7 to 35.5	
Postoperative HHS				
Mean (SD)	85.3 (5.2)	86.0 (5.2)	84.3 (5.2)	0.369
Range	78.7 to 92.9	79.9 to 92.9	78.7 to 90.0	
Difference in HHS				
Mean (SD)	53.1 (5.0)	53.1 (4.7)	53.1 (5.4)	1
Range	45.4 to 60.9	45.4 to 59.0	46.3 to 60.9	
Preoperative ROM				
Limited	15 (47%)	8 (44%)	7 (50%)	0.755
No	17 (53%)	10 (56%)	7 (50%)	
Postoperative ROM				
Normal	32 (100%)	18 (100%)	14 (100%)	0.480
Preoperative hip pain				
Severe	32 (100%)	18 (100%)	14 (100%)	0.480
Postoperative hip pain				
Mild	14 (44%)	10 (56%)	4 (29%)	0.127
No	18 (56%)	8 (44%)	10 (71%)	
Preoperative knee pain				
No	10 (31%)	7 (39%)	3 (21%)	0.572
Mild	10 (31%)	5 (28%)	5 (36%)	
Moderate	12 (38%)	6 (33%)	6 (43%)	
Postoperative knee pain				
No	16 (50%)	8 (44%)	8 (57%)	0.476
Mild	16 (50%)	10 (56%)	6 (43%)	
Preoperative low back pain				
No	8 (25%)	5 (28%)	3 (21%)	0.657
Mild	3 (9%)	2 (11%)	1 (7%)	
Moderate	1 (3%)	0 (0%)	1 (7%)	
Severe	4 (13%)	2 (11%)	2 (14%)	
Postoperative low back pain				
No	8 (25%)	5 (28%)	3 (21%)	0.881
Mild	4 (13%)	2 (11%)	2 (14%)	
Moderate	4 (13%)	2 (11%)	2 (14%)	
Hip deformity				
Flexion	20 (63%)	10 (56%)	10 (71%)	0.381
Flexion and adduction	10 (31%)	6 (33%)	4 (29%)	
Flexion, adduction, and external rotation	2 (6%)	2 (11%)	0 (0%)	
Preoperative limb length discrepancy				
Mean (SD)	1.2 (1.0)	1.3 (0.9)	1.1 (1.1)	0.794
Range	0 to 3	0 to 2.5	0 to 3	

Postoperative complications

No postoperative complications were reported except for two cases. The first was a limb that suffered from weak dorsiflexion that improved gradually and required no further investigations or management, while the other had bilateral deep vein thrombosis (DVT), three months after the operation due to unrelated decrease in ambulation. No complications from the DVT were reported.

DISCUSSION

In this study, we aimed to present a case series of sixteen patients who had bilateral fused hips due to various causes and received bilateral THA using the technological advance, PSI. Our sample comprised of seven females and nine males with equal distribution of laterality. We found that all patients had improved HHS, ROM, hip deformity, hip pain, knee pain, low back pain, and limb length discrepancy.

Although this is not the first study to report the outcomes of THA in hip fusion, to the extent of our knowledge, this is the first study to report the outcomes of bilateral THA in hip fusion patients. Hip fusion is an important entity that has been neglected for many years. Patients with hip fusion are exposed to various operations that may not lead to long-term improvements in quality-of-life [15,16]. Consequently, individuals who have fused hips may wish to undergo a THA conversion operation. Other indications for conversion to total hip arthroplasty include adjacent joint illness, limited mobility, trouble maneuvering in tight areas, functionally devastating pain, and patient discontent [7].

In comparison to our results, in a systematic review of 27 studies that included a total of 1104 hips, the most common causes of hip arthrodesis were primarily infection-related (40%), traumatic (14%), and osteoarthritis (12%). Other causes such as autoimmune disease, post-THA, failed arthroplasty, or even idiopathic were reported. The review also included some details about the common complications following THA in this group. The most common complications included high revision rates ranging from 0% to 44%, aseptic/septic loosening (6.2%), infection (5.3%), and instability (2.6%) [7].

Still, only a handful of studies have investigated the functional outcomes like HHS. In the systematic review, only eight studies reported HHS [17-24], only a few studies reported quantitative patient satisfaction or other patient-reported outcomes (although many studies reported general satisfaction with the outcomes) [11,19,20,25-30].

Regardless, this study suffers from some limitations. Firstly, the retrospective design makes it harder to draw conclusions about the overall survival of the implants. However, we overcame this problem by using the ECAR database, which already registers the follow-up appointments of all patients. Secondly, our sample size was not big enough to draw conclusions about differences between different sexes or different arthroplasty techniques (e.g., simultaneous vs staged THA or conventional vs PSI). Lastly, it would have been beneficial to compare various interventions other than THA to see if clinical outcomes and cost may differ between them. Still, we wanted to focus more on the outcomes of bilateral THA in those patients.

CONCLUSION

In this study, we aimed at viewing the outcomes of bilateral THA in patients with bilateral hip fusion. We found that THA is a superb option for bilateral fused hips regardless of the etiology, sex, or age of participants. However, further longitudinal studies are required to confirm the use of PSI and other technological advances in these patients and compare the outcomes of simultaneous versus staged THA in those patients.

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