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Original Article

Total Hip Arthroplasty in Patients Under 50 Years of Age: A Demographic and Treatment Outcome Study at Five Years Follow-Up

Bibek Banskota[1,2], Ansul Rajbhandari[1,2], Rajendra Aryal[1,2], Ashok Kumar Banskota[1,2]

[1]Department of Orthopedics, B&B Hospital, Gwarko, Lalitpur, Nepal [2]Department of Orthopedics, Hospital and Research Centre for Disabled Children (HRDC), Banepa, Kavre, Nepal

ABSTRACT

Introduction: The indications for a total hip arthroplasty have expanded to younger, higher-demand patients with the advances and availability of durable biomaterials and improved accuracy and surgical techniques of prosthesis implantation. We present our data on the mid-term (five years) follow-up of a cohort of younger patients who underwent THA at our institution.

Methodology: A retrospective study with prospective measurement of functional and patient satisfaction outcomes was conducted for patients under 50 years of age who had undergone a primary THA for any cause from 2010 to 2020. Study variables included demographic profile, etiology, prosthesis details, pre-and post-Harris Hip Scores (HHS), and the short-form SF-12 questionnaire.

Results: Of 206 THAs performed during the study period, 62 (30.09%) THAs met the inclusion criteria. There were 60 patients with 62 hips, including 38 (63.33%) males and 22 (36.67%) females. The mean age was 39.2±7.92 years. The mean pre-operative HHS was 40.10±5.96. The mean follow-up period was 5.14±2.57 years. At the final evaluation, the mean HHS was 90.42±6.35, and SF-12 scores for physical (PS) and mental (MS) domains were 46.98±5.76 and 54.22±4.35, respectively. The HHS was excellent in 45 (72.58%) hips, good in 13 (20.96%) hips, fair in 2 (3.23%) hips, and poor in 2 (3.23%) hips.

Conclusion: Good to excellent functional results were seen in 94% of patients at five years follow-up. Uncemented prostheses and ceramic-on-polyethylene bearing surfaces were preferred.

Keywords: Adult, Arthroplasty, Hip, Replacement

INTRODUCTION

Total hip arthroplasty (THA) is a standard surgical procedure to relieve pain and improve function in patients with end-stage hip joint disease.[1,2] Historically, this procedure has been primarily performed in older patients, but there is a growing trend toward THA in younger patients.[3-8] This trend is driven by increased hip joint disease in younger populations and advances in implant design and surgical techniques that improve outcomes in younger higher-demand patients who may be engaged in recreational sports and manual work.[6] However, a consideration for THA in younger patients is the need for future revision surgery.

The present study looked at THA performed at our institution in patients under 50 to define the indications, prosthesis details, demography, and mid-term functional scores.

Correspondance:

Dr. Bibek Banskota
Department of Orthopedics, B&B Hospital, Gwarko, Lalitpur, Nepal.
Tel: +977-9801043203, Email: bibekbanskota@gmail.com

METHODS

This study was ethically approved, and all patients were consented. All patients who were 50 years or below who received a primary total hip arthroplasty (THA) between 2010 – 2020 were included; those above 50 years of age, and those that underwent revision THA, were excluded. The same team did all hips through the posterior Kocher-Langenbach approach, and the same standard post-operative protocol was adopted.

This study had retrospective and prospective components. Retrospective chart review furnished information on demographic data, primary diagnosis, indication for THA, pre-operative Harris Hip Score (HHS), and prosthesis details. The prospective component at five years included follow-up Harris Hip Score (HHS) and the SF-12 questionnaire, administered prospectively by the first author. All interviews at follow-up were conducted in person. Retrospective data on demography, diagnosis, indication, pre-operative Harris Hip Score (HHS), and prosthesis details was collected, followed by prospective evaluation of outcome measures, including the Harris Hip Score (HHS) and SF-12 questionnaire.

Continuous data were reported as mean (SD), and categorical data were reported as number (percentage). Data were analyzed using SPSS software, version 24.0.

RESULTS

A Of 206 THAs performed during the study period, 62 (30.09%) THAs met the inclusion criteria. There were 60 patients with 62 hips, including 38 (63.33%) males and 22 (36.67%) females. The mean age was 39.2±7.92 years. Pre-operative HHS was 40.10±5.96. (Table 1)

Table 1 Baseline Characteristics (N=62)

Characteristics	Frequency, n (%)
Side	
Right	35 (54.84%)
Left	27 (41.94%)
Type	
Uncemented	61 (98.38%)
Hybrid (cemented stem and uncemented cup)	1 (1.62%)
Bearing Surface	
Ceramic-on-poly	59 (95.16%)
Metal-on-poly	3 (4.83%)
Femoral Head Size	
32mm	36 (58.06%)
36mm	11 (17.74%)
28mm	9 (14.51%)
30mm	6 (9.67%)
Polyethylene Liner Size	
54mm	20 (32.26%)
52mm	19 (30.64%),
50mm	18 (29.04%),
48mm	3 (4.84%)
58mm	1 (1.61%)
60mm	1 (1.61%)

At a mean follow-up of 5.14±2.57 years (range, 1 to 10 years), the HHS was 90.42±6.35, the average SF-12 (physical component) was 46.98±5.76, and the SF-12 (mental part) was 54.22±4.35. The HHS was excellent in 45 (72.58%) hips, good in 13 (20.96%) hips, fair in 2 (3.23%) hips, and poor in 2 (3.23%) hips. Radiologically there was no evidence of osteolysis and prosthetic loosening, and none of the patients demonstrated a lurch or complained of limb length inequality . (Table 2 and Figure 1-4)

Table 2 Indications for THA versus frequency of Harris Hip Scores (HHS)

SN	Indication	Frequency	E	G	F	P
1	AVN	39	29 (74.4%)	9 (23.1%)	1 (2.5%)	
2	OA (D)	7	4 (57.1%)	2 (28.6%)	1 (14.3%)	
3	OA (PI)	5	4 (80%)	1(20%)		
4	OA (PT)	4	3 (75%)	1 (25%)		
5	AS	3	1 (33.3%)			2 (66.7%)
6	FH FX	2	2 (100%)			
7	NOF FX	1	1 (100%)			
8	RA	1	1 (100%)			
	TOTAL	**62**	**45 (72.6%)**	**13 (21%)**	**2 (3.2%)**	**2 (3.2%)**

Harris Hip Score Interpretation: P-POOR (<70), F-FAIR (70-80), G-GOOD (80-90), E-EXCELLENT (90-100), AVN- Avascular Necrosis, OA- Osteoarthritis, RA- Rheumatoid Arthritis, FH-Femoral head, NOF-Neck of Femur, OA (D)- Osteoarthritis Degenerative, OA (PI)- Osteoarthritis Post Infective, OA (PT)- Osteoarthritis Post Trauma.

Figure 1. Pelvis AP view of a 47-year-old patient showing lateral advanced AVN with head collapse.

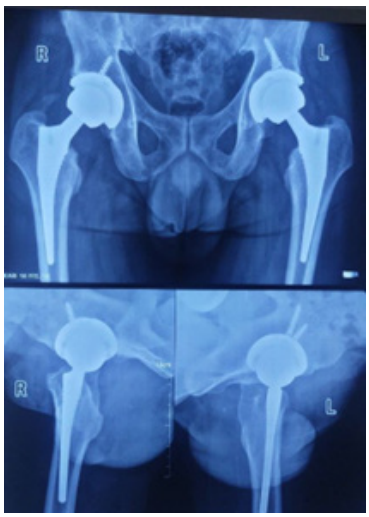

Figure 2: Eight years follow-up x-rays (AP & Lat views) of the patient after staged bilateral uncemented ceramic-on-poly THA for continuous pain compromising the quality of life.

Figure 3: Comfortable single-leg stance on both legs at eight years follow-up.

Figure 4: Comfortable squat and cross-leg sitting at eight years follow-up.

DISCUSSION

Our study participants (patients under 50) comprised 31% of the THAs performed at our institution over ten years. Contrary to elderly patients in whom hip osteoarthritis is the most common indication for a THA[1], we found that AVN of the hip, followed by post-traumatic arthritis, was the most common indication for THA. Another study from our sub-continent[2] echoes this observation.

Both cemented, and uncemented systems seem to perform well in young patients, as shown by the various joint registry data worldwide [3–8]. Almost all our patients underwent uncemented THA (except one case of hybrid), considering the need for an adequate bone stock for future revision surgery in our environment where bone banking is unavailable, and revision hardware is difficult to secure. While cemented THAs have the merits of immediate stability, proven long-term results, and suitability in older patients with osteoporotic bone, they have the demerit of cement-related complications and osteolysis and bone loss, thus making them less suitable in situations where revision surgery is anticipated, such as in younger patients[9–11]. A review of national joint registries (NJR) [3–8] shows that multiple prosthesis types and bearing surfaces have been preferred in different countries. The Swedish NJR predominates cemented THAs and metal-on-poly bearing surfaces, performing well at long-term follow-up across all age groups. Revision rates at 10-15 years of follow-up for the various NJRs range from 3.9% to 5.5%, and all report higher revision rates for uncemented implants than cemented or hybrid implants. We preferred using uncemented components to preserve bone stock for future revision surgery in younger patients.

The NJR data [3–8] on bearing surfaces show that the 'metal-on-polyethylene' was a majority in Sweden, Denmark, Norway, and most in England, Australia, and New Zealand, whereas 'ceramic-on-polyethylene' predominated in Germany and the Netherlands. As expected, 'metal-on-metal' bearing has largely gone out of favor, as reflected in the NJR data for the countries above. In our series, the vast majority (59 THAs) were ceramic-on-poly, and only a few (3 THAs) were metal-on-poly, functioning well at five years follow-ups. Similar to other published reports, our bearing surface for the younger patient is either a ceramic-on-ultra high molecular weight polyethylene (UHMWP) or a metal-on-UHMWP. Though ceramic-on-ceramic bearing is another popular choice [4], we have not used this, mainly due to unpredictable availability in our setting and on par performance of ceramic-on-poly bearing surfaces[12,13]. Also, we have not used metal-on-metal bearing due to reports of early failure and risk of metal ion toxicity [14].

A study examining five years of THA follow-ups in patients under 55 found that the only factor influencing revision surgery was a metal-on-polyethylene bearing surface[11]. While the Australian registry reports that younger age, male gender, and specific diagnosis (such as osteoarthritis) were associated with better implant survival rates [4], the Swedish registry reports slightly higher revision rates for younger patients and men[6]. We had no cases requiring revision surgery at five years follow-ups. Makhdom et al. [15]. studied the outcomes of THR in patients aged 50 years or younger and found that younger patients had a higher risk of implant failure and revision surgery than older patients. However, similar to our results, this study also found that younger patients experienced significant improvements in pain relief and function following surgery, with 91% of patients reporting good or excellent outcomes five years post-surgery. Liow et al. [16] evaluated the long-term effects of THR in young patients with primary osteoarthritis (under the age of 55) over 25 years. The study found that younger patients had a higher risk of implant revision than older patients, but the overall survival rate of the implant was still relatively high (86% at 25 years). The study concluded that THR could be viable for young patients with end-stage hip joint disease. Still, that careful patient selection and implant choice are critical for achieving optimal outcomes.

Two hips showed poor HHS results and were seen in the same patient with severe ankylosing spondylitis with gross spinal deformity. This was despite a considerable increase in the HSS from the pre-op value (from 44 to 67). The dual-mobility system, where available, is the prosthesis of choice

for this type of patient with spinopelvic deformity and stiffness[17].

Limitations of our study include study groups with heterogeneous pathology, retrospective nature, and small sample size.

CONCLUSION

THA in young patients yields improved hip scores (HHS), quality of life, and patient satisfaction at mid-term follow-up. The indications for THA for this age group are different compared to elderly patients, and both cemented and uncemented systems work very well. Our choice of prosthesis and bearing surface is guided mainly by the inevitable need for future revision surgery.

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