

Original Research Article

Surgical technique of total hip arthroplasty: an experience from a tertiary level hospital in India

Lokesh Gupta¹, Mukund Lal², Vineet Aggarwal², Lakshya Prateek Rathor^{1*}

Department of Orthopaedics, ¹Shri Lal Bahadur Shastri Government Medical College and Hospital, Mandi at Nerchowk, ²Indira Gandhi Medical College, Shimla, Himachal Pradesh, India

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*Correspondence:

Dr. Lakshya Prateek Rathor,

E-mail: dr Guptaigmc@gmail.com

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ABSTRACT

Background: Total hip arthroplasty (THA) is performed for patients with hip pain, which may arise due to a variety of conditions.

Methods: An observational study of 20 hip joints presenting to the Department of Orthopedic Surgery, Indira Gandhi Medical College Shimla from December 2008 till December 2010 for THR was done. Laboratory and imaging investigations were performed as per the standard operating protocol of our center. Modified Harris Hip scoring was done for all included patients pre-operatively. A posterolateral approach with posterior dislocation of hip was used in all the patients. Pre-operative and intra-operative details were noted using a pretested semi-structured questionnaire. Data were analysed descriptively and tabulated to draw conclusions.

Results: Both sides were operated with equal frequency, while one patient had a bilateral THA. Most common indication of surgery was osteoarthritis secondary to avascular necrosis head of femur (n=16). Pre-operative modified Harris hip score was poor in all 20 hip joints. Duration of surgery ranged from 110 minutes to 190 minutes, mean duration being 139 minutes. Average blood loss during the surgical procedures was about 532 ml with average drainage of about 230 ml. On an average medullary canal flare index of 3.97 was for all the patients. Morphological cortical index averaged at 3.11 and Dorr index at 3.54.

Conclusions: Most systems for THA are modular which provide flexibility in dealing with intraoperative anatomical variations. Different types of femoral and acetabular implants are available for use which reflect the different philosophies regarding the techniques involved in THA. Further studies are required to support our findings.

Keywords: Modified Harris hip score, Total hip arthroplasty, Hip joint

INTRODUCTION

Total hip arthroplasty (THA) is one of the most successful orthopedic procedures performed for patients with hip pain, which may arise due to a variety of conditions. THA can relieve pain, restore function, and eventually improve quality of life. The fundamental principles of the artificial hip were developed by John Charnley, and is considered as the father of THA.¹ A number of conditions can affect the “ball and socket” function and can result in deterioration of the joint. THA

is an elective procedure and is indicated in patients who have failed conservative or previous surgical treatment options for a deteriorated hip joint and who continue to have debilitating pain. The procedure may benefit a small proportion of those patients who have significant and limited motion, even in the absence of severe pain.² The decision to proceed with THA is made with explaining and counselling the patients and their family members about the potential risks and benefits. An important component of the decision to operate is clear understanding of both the procedure and the anticipated

outcome. Through this article we aim to describe our technique of the surgical procedure involved in THA.

METHODS

Study design and sampling

An observational study of 20 hip joints presenting to the Department of Orthopedic Surgery, Indira Gandhi Medical College Shimla from December 2008 till December 2010 for THR was done. All patients with good bone stock, long life expectancy needing THR for painful disabling hip were included in the study. Older patients with life expectancy less than 15 years, soft osteoporotic bones, requiring revision surgery, active infection of hip joint, insufficiency of abductor mechanism, hips unsuitable for summit stem on templating and those with mismatch between expectations and outcome were excluded from the study.

Data collection and data analysis

After obtaining approval of the institutional ethics committee, eligible patients were approached for the study. The purpose of the study was explained to the patients and an informed written consent was obtained before inclusion in the study. Detailed history and physical examination was done for all patients special focus on to whether the pain originated from hip joint or was referred from somewhere else; deformity, limitation of movement, allergy to metals/medications, any other generalized body diseases or affection likely to influence surgery or its outcome. Routine and specific laboratory investigations were performed as part of the pre-anesthetic assessments and fitness. With tube to film distance of 40 inches to get standard magnification for templating, x-rays of both hips with upper half of femora- antero posterior views in neutral position and then in 150 degrees internal rotation, lateral views of both hips with upper half of thigh were taken. In selected, cases x-ray lumbosacral spine and bilateral sacroiliac joints were done. Computerized tomography (CT) scan of both hips was required in some patients to get more information regarding hip joint space, fibrous or bony ankylosis, cystic lesions in femoral heads, thickness of medial wall of acetabulum, defects in acetabular wall particularly in fracture dislocations. Modified Harris Hip scoring was done for all included patients pre-operatively.³ Femoral canal configuration was determined using medullary canal flare index (CFI), morphological cortical index (MCI) and Dorr index. Medullary canal flare index was calculated as the ratio of mediolateral width of canal 2 cm above the lesser trochanter to the width of canal isthmus. Morphological cortical index is the ratio of distance between outer limit of medial and lateral cortex layer, measured at the level of greatest prominence of lesser trochanter to the diameter of medullary canal 7 cm distal to the above line. Dorr index is the ratio of canal diameter at the level of lesser trochanter to the canal diameter at a point 10 cm distal to it. Templating was done to choose

appropriate implants and anticipating unusual needs during surgery. Most sizing predictions for acetabulum and femoral component were made on the antero-posterior radiographs of the hip. Patients once fit for anaesthesia and surgery were taken up for surgery. In true lateral position, a large sized K-nail firmly in contact with both anterior superior iliac spines was used to assess the position of pelvis. A posterolateral approach with posterior dislocation of hip was used in all the patients. Pre-operative and intra-operative details were noted using a pretested semi-structured questionnaire. Data were analysed descriptively and tabulated to draw conclusions.

RESULTS

Table 1: Baseline characteristics of the patients.

Variables	N
Total number of patients	20
Age structure (in years)	
21 to 30	2
31 to 40	3
41 to 50	8
51 to 60	4
More than 60	3
Gender distribution	
Females	6
Males	14
Side of surgery	
Right	9
Left	9
Bilateral	1
Indication of surgery	
Osteoarthritis secondary to avascular necrosis head of femur	16
Polyarticular rheumatoid	1
Fracture neck of femur	1
Infection	2
Past medical history	
Hypertension	8
Hypertension with epilepsy	1
None	11
Pre-operative modified Harris Hip score	
90-100 (excellent)	0
80-89 (good)	0
70-79 (fair)	0
Less than 70 (poor)	20

During the study period a total of 20 hip joints were included in the study. Most common age group involved was 41 to 50 years, mean age was 47.52 years and male patients predominated in our study population (Table 1). Both sides were operated with equal frequency, while one patient had a bilateral THA. Most common indication of surgery was osteoarthritis secondary to avascular necrosis head of femur (n=16). Two patients had infection. Amongst them one case was operated previously with excision of head of femur & debridement for tuberculosis

hip. Another case was operated case of fracture neck of femur with active infection. He was also treated in two stages. One case was conversion surgery of operated case of fracture neck of femur with cancellous screws in situ with avascular necrosis head of femur. 40% cases were hypertensive & one case was having epilepsy in addition to hypertension. All cases were operated with a posterolateral approach under general anesthesia. Pre-operative modified Harris hip score was poor in all 20 hip joints. Duration of surgery ranged from 110 minutes to 190 minutes, mean duration being 139 minutes. Intra-operatively additional soft tissue release was required in all cases. Release of gluteus maximus tendon was done in all surgeries, while adductor tenotomy and release of

gluteus maximus tendon was done in osteoarthritis and infected cases only (Table 2). Adductor tenotomy, release of gluteus maximus tendon and pancapsular release was done only in osteoarthritis cases. Average blood loss during the surgical procedures was about 532 ml with average drainage of about 230 ml. More than 500 ml of negative suction drainage was done for cases operated for osteoarthritis cases. Intraoperative change of plan was done in 3 cases, due to smaller diameter of medullary canal than smallest size of summit implant available, as they were having average medullary canal flare index of 3.66. On an average medullary canal flare index of 3.97 was for all the patients. Morphological cortical index averaged at 3.11 and Dorr index at 3.54.

Table 2: Intra-operative details of the patients.

	Osteoarthritis secondary to avascular necrosis head of femur	Polyarticular Rheumatoid	Fracture neck of femur	Infection
Additional soft tissue release				
Adductor tenotomy	0	0	0	0
Release of gluteus maximus tendon	3	1	1	1
Adductor tenotomy + release of gluteus maximus tendon	9	0	0	1
Adductor tenotomy + release of gluteus maximus tendon+ pancapsular release	4	0	0	0
Negative suction drainage (in ml)				
100 to 250	12	1	1	1
251 to 500	2	0	0	1
501 to 750	2	0	0	0
751 to 1000	0	0	0	0
More than 1000	0	0	0	0

DISCUSSION

This observational study looked at various pre- and intra-operative parameters of 20 hips which were operated for THA. Mean age of our patient population was 47.5 years, which is relatively young as compared to mean age reported in other similar studies.⁴ High incidence in younger age group in our study can be due to the fact that majority of the patients in our study were from poor socioeconomic status, who were not treated adequately during the initial stages of hip pain when other methods of treatment for AVN can be considered. The most common indication for THA in our study was osteoarthritis secondary to avascular necrosis of femoral head (80% of cases). Similarly, high proportion of patients with osteoarthritis requiring THA have been reported earlier as well. A registry by Indian society of hip and knee surgeons shows that 49% of THA were performed for avascular necrosis.⁴ Similar proportions have been reported in other parts of the world as well.⁵

General anesthesia was used for all cases. Regional anesthesia was tried in some cases but it was observed that after some time in lateral position patients got tired

and attempted to change their position, particularly at pressure points. Due to persistent muscle action while using regional anesthesia, pre-operative bleeding was more. Moreover, change in the true lateral position of the patient would ultimately affect position of the cup. However, preference of regional versus general anesthesia is often debated. A recently published systematic review of 29 studies found that as compared to general anaesthesia, neuraxial anaesthesia significantly reduced length of stay and found no statistically significant differences for mortality, surgical duration, surgical site or chest infections, nerve palsies, postoperative nausea and vomiting, or thromboembolic disease when antithrombotic prophylaxis was used.⁶ But because much of the published literature which voices support to the use of regional anesthesia in THA is mainly retrospective, it is difficult to establish a causal link. This calls for multicentric randomized trials in future to support this practice.

All the patients in this study were operated using the posterolateral approach. Hip is exposed in the posterolateral approach by splitting the gluteus maximus muscle and dissecting off the short external rotators on

the posterior aspect of the hip. The direct lateral approach gains exposure by splitting the anterior portion of the abductors and provides access to the hip through the anterior hip capsule. While the anterior approach gains exposure to the hip without detachment of the surrounding muscles and is performed with the patient supine and often with the assistance of fluoroscopy. The posterolateral approach disrupts the posterior soft tissue of the hip and historically has shown a higher rate of dislocation than the direct lateral approach. However, the direct lateral approach has demonstrated a higher risk of postoperative limp and heterotopic ossification secondary to disruption of the abductors.⁷ Minimally invasive THA has been of increased interest to both patients and surgeons, in which the standard incision for THA may be reduced to 10 cm or less.⁸ The proposed advantages are the potential for decreased blood loss, decreased surgical time, less surgical trauma, quicker rehabilitation, shorter hospital stay, and reduced costs.⁹ These advantages may be overshadowed by potential disadvantages which include limited visualization, component malposition, increased skin trauma, and difficulty determining leg lengths.

Soft tissue release was required in all cases. Tendon of gluteus maximus was released in all the cases. Adductor tenotomy was done in 14 cases and pan capsular release in 4 cases. Soft tissue release was more in patients having fixed deformities of hip joint in the form of fixed flexion, fixed adduction, shortening and lumbar lordosis. These deformities were persisting for years so they required extensive additional soft tissue release to achieve proper mobility and stability of the hip. Also, patients in our study being primarily from rural background were adapted to hard life, and thus were more tolerant to pain and deformity, resulting in their late presentation. Careful preoperative planning, its intelligent execution during surgery and proper postoperative rehabilitation worked well in these difficult situations.

CONCLUSION

This study describes our experience and technique of operating patients with THA using the posterolateral approach under general anesthesia. A careful preoperative evaluation is essential to help diagnose hip pathology, to identify appropriate surgical candidates and to assist with surgical planning. THA may involve substantial intra- and peri-operative blood loss which may in some cases increase the risk of cardiovascular and cerebrovascular

ischemic events. Most systems for THA are modular which provide flexibility in dealing with intraoperative anatomical variations. Different types of femoral and acetabular implants are available for use which reflect the different philosophies regarding the techniques involved in THA.

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Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Duffy GP, Berry DJ, Rowland C, Cabanela ME. Primary uncemented total hip arthroplasty in patients <40 years old: 10- to 14-year results using first-generation proximally porous-coated implants. *J Arthroplasty*. 2001;16:140.
2. McLaughlin JR, Lee KR. Total hip arthroplasty in young patients. 8- to 13-year results using an uncemented stem. *Clin Orthop Relat Res*. 2000; 153.
3. Byrd JW, Jones KS. Hip arthroscopy in the presence of dysplasia. *Arthroscopy*. 2003;19:1055-60.
4. Pachore JA, Vaidya SV, Thakkar CJ, Bhalodia HK, Wakankar HM. ISHKS joint registry: a preliminary report. *Indian J Orthop*. 2013;47(5):505.
5. Lai YS, Wei HW, Cheng CK. Incidence of hip replacement among national health insurance enrollees in Taiwan. *J Orthop Surg Res*. 2008;3:42.
6. Johnson RL, Kopp SL, Burkle CM, Duncan CM, Jacob AK, Erwin PJ, et al. Neuraxial vs general anaesthesia for total hip and total knee arthroplasty: a systematic review of comparative-effectiveness research. *British J Anaesthesia*. 2016;116(2):163-76.
7. Foster DE, Hunter JR. The direct lateral approach to the hip for arthroplasty. Advantages and complications. *Orthopedics*. 1987;10:274.
8. Wenz JF, Gurkan I, Jibodh SR. Mini-incision total hip arthroplasty: a comparative assessment of perioperative outcomes. *Orthopedics*. 2002;25:1031.
9. Waldman BJ. Minimally invasive total hip replacement and perioperative management: early experience. *J South Orthop Assoc*. 2002;11:213.

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