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Original Research Article

Comparison of Functional Outcomes between Posterior and Lateral Approaches for Primary THA

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Abstract

Background: The whole hip prosthesis is anticipated to carry out a mechanical function by transmitting motion and weight load. Since these two procedures are the most often used and both offer sufficient exposure for complete hip replacement, we evaluated both. There is disagreement over the relative benefits of these strategies, despite the fact that no study has definitively shown that one is superior to the other. In this paper, the problems associated with choosing a surgical strategy are discussed.

Materials & Methods: 30 patients receiving complete hip replacements at the orthopaedic department of Patna Medical College Hospital in Bihar, India, from October 2021 to October 2022 were the subject of a prospective study. Both a posterior gluteal splitting strategy and a lateral muscle splitting approach were performed on 15 individuals each. They were all admitted in rooms designated specifically for individuals having total hip replacements. There was a thorough clinical examination and history taken. Range of motion, discomfort, function, and the Trendelenburg test were all evaluated prior to surgery. All of these patients had evaluation exams three months after their operations.

Results: The average age was 55.42. The typical follow-up period was 110.52 days. To assess pain and function, the Harris Hip Score was collected both before and after surgery. The posterior method was significantly different from the lateral technique.

Conclusion: We came to the conclusion that total hip arthroplasty utilising either the lateral method or the posterior route produces equally satisfactory results for the functional outcome, gait, and Trendelenburg test.

Keywords: THA, Harris Hip Score, Gait, Trendelburg Test, Functional Score.

Introduction

The entire lower extremities can move in three planes of motion because the hip joint is built for both mobility and stability. The hip helps the torso and upper body absorb shock and maintain stability while standing and performing other weight-bearing tasks [1]. Total hip replacement refers to replacement of a diseased hip joint with an artificial acetabulum and head of femur. It is indicated for arthritis of the hip joint, which usually leads to increase in pain, deteriorating gait and stiffness. Currently it is the procedure of choice for most hip conditions. The extraordinary success of total hip replacements has led to a

progressive increase in the number of replacement surgeries done.

Rapid advancements have been made as a result of clinical study on various hip replacement components, although the surgeon still chooses the strategy [1]. The whole hip prosthesis is anticipated to carry out a mechanical function by transmitting motion and weight load. Not only must low frictional resistance be maintained between a joint but also the torsional force transmitted from the prosthetic femoral head to the socket must be resisted for a successful arthroplasty [2]. Human gait is bipedal, biphasic, forward propulsion of centre of gravity, in which there is alternate sinuous movement of head and body, with least expenditure of energy.

The main goal of complete hip replacement is to produce a stable, useful, and painless hip. The ability of the surgeon to acquire appropriate surgical exposure while limiting difficulties to attain the ideal implant position is crucial to the success of total hip arthroplasty. The ideal surgical strategy for a total hip replacement is a topic of disagreement among orthopaedic surgeons. The proponents of the posterior approach claim better exposure, less blood loss and easy implant positioning without abductor damage but the proponents of lateral approach site a higher rate of dislocation in posterior approach. Today, the most commonly performed approaches to total hip arthroplasty include the abductor muscle splitting lateral approach and the posterior approach [2]. The aim of this study to compared the gait, trendelenburg test and functional outcome between lateral and posterior approaches for primary total hip replacement (THA).

Materials and Methods

30 patients who were having complete hip replacements at the orthopaedic department of Patna Medical College Hospital in Bihar, India, from October 2021 to October 2022 were the subject of a prospective study.

Inclusion Criteria: Any patient with hip arthritis or unstable hip with

1. Age more than 40 years (Skeletally mature).
2. Normal preoperative electromyography.

Exclusion Criteria:

1. Age less than 40 years and more than 80 years.
2. Signs of abnormal nerve function.
3. Dysplastic hip.
4. Neurological disease or history of sciatica with neurological signs.

The diagnosis includes ankylosing spondylitis, rheumatoid arthritis, avascular necrosis, TB, chronic arthritis owing to primary osteoarthritis, and a nonunion neck of femur. Both a posterior gluteal splitting strategy and a lateral muscle splitting approach were performed on 15 individuals each. All of them were admitted in special rooms allocated for patients who are to undergo total hip replacement. A detailed history and clinical examination was done. Preoperative assessment of range of movements, pain, function and Trendelenburg test were done.

Surgical procedure

The patient is lying on a sandbag for the lateral approach. In every instance, the modified Hardinge [3] method was applied. Make a lazy-J incision with the posterior direction that is centred above the greater trochanter. Divide the fascia lata over the greater trochanter, parallel to the skin incision. To reveal the vastus lateralis origin and the gluteus medius insertion, retract the tensor fasciae latae anteriorly and the gluteus maximus posteriorly. Remove the posterior part of the gluteus medius tendon from the greater trochanter while cutting the tendon obliquely across the trochanter. Carry the incision proximally in line with the fibers of the

gluteus medius at the junction of the anterior and middle thirds of the muscle. Distally, carry the incision posteriorly in line with the fibers of the vastus lateralis down to bone along the anterolateral surface of the femur. Elevate the tendinous insertions of the anterior portions of the gluteus minimus and vastus lateralis muscles. Abduction of the thigh then exposes the anterior capsule of the hip joint. The Capsule is incised, and hip dislocated.

Use non-absorbable braided sutures to repair the gluteus medius tendon during closure. The patient is positioned on the unaffected side in the posterior [4] approach. To reach the posterior margin of the greater trochanter, extend the incision distally and laterally parallel with the gluteus maximus fibres, starting at 10 cm distal to the posterosuperior iliac spine. The incision should then be made 10 to 13 cm distally and parallel to the femoral shaft. Expose and divide the deep fascia in line with the skin incision. By blunt dissection separate the fibers of the gluteus maximus; taking care not to disturb the superior gluteal vessels in the proximal part of the exposure. Retract the proximal fibers of the gluteus maximus proximally and expose the greater trochanter. Retract the distal fibers distally and partially divide their insertion into the linea aspera in line with the distal part of the incision.

Next, separate the short external rotators where they attach to the femur, then medially retract the muscles. Now that the posterior joint capsule is clearly visible, cut it from distal to proximal along the femoral neck's line to the rim of the acetabulum. Flex the thigh and knee 90 degrees, internally rotate the thigh, and dislocate the hip posteriorly. The femur and acetabulum are reamed to appropriate sizes and the prosthesis is inserted. The use of methyl methacrylate was left to the discretion of the individual surgeon. All patients were placed in an abductor pillow in the operating room. Beginning on the night of surgery, all patients received mechanical prophylaxis for thromboembolism in the form of ankle foot pump exercises and calf muscle squeezing. None of the patients received anticoagulants.

Beginning on the first postoperative day, all patients underwent physical therapy while in bed, which included isometric hip abduction and knee extension. After the drain was removed and a radiograph was taken, ablating was also approved on the second postoperative day. Beginning the second day after surgery, patients who had cemented arthroplasties were permitted to bear as much weight as tolerated while using crutches. Patients treated with uncemented arthroplasties were allowed 10 % weight-bearing with crutches, beginning on the second postoperative day. Toe touch weight bearing was continued for six weeks and then progressed to full weight bearing in a gradual manner between six and 12 weeks. Compliance of patients was excellent in all groups. All these patients were examined 3 months postoperatively for assessment.

The functional outcome of hip surgery is measured using Harris Hip Score. It gives a maximum of 100 points. The domains include pain (44 points), Function (47 points), Deformity (4 points) and Range of motion (5 points). Function is subdivided into activities of daily living – 14 points and gait –33 points. A Score of 90-100 means excellent results, 80-90 being good, 70-79 fair, and below 70 poor. It is assessed before and after surgery to determine improvement. Trendelenburg test was assessed preoperatively and postoperatively.

Statistical Analysis

All study variables were entered into a database, calculated using the SPSS 21.0 for Windows application, and statistically compared between patients treated utilising the posterior and lateral approaches. In the statistical analysis,

means of various parameters were compared, and the resulting p values were presented along with 95% confidence intervals.

RESULTS

Thirty patients received total hip arthroplasties, with 15 receiving the Modified Hardinge technique [3] (cemented -5, uncemented -10), and 15 receiving the posterior approach [4]. (cemented-5, uncemented-10). The average age was 55.42. The typical follow-up period was 110.52 days. To assess pain and function, the Harris Hip Score [5] was collected both before and after surgery. The posterior method was significantly different from the lateral technique. In contrast to the posterior group, where the mean preoperative Harris Hip Score was 32.65, the lateral group's mean preoperative Harris Hip Score was 44.53. The mean postoperative Harris Hip Score was 78.82 in the lateral group whereas the mean postoperative Score was 88.76 in the posterior group. Overall the mean improvement in Harris Hip score16 in the lateral group was 34.23 and in the posterior group 56.11 (table 1).

Table 1: The comparison of mean Harris Hip Score and Trendelenburg test in lateral and posterior surgical approach

Surgical approaches	Harris Hip Score			Trendelenburg test		
	Pre-op	Post-op	Improvement	Pre-op	Post-op	Improvement
Lateral approach	44.53 ± 2.66	78.82 ± 5.23	34.23 ± 2.57	5.36 ± 0.593	3.28 ± 0.852	2.08 ± 0.316
Posterior approach	32.65 ± 3.18	88.76 ± 6.82	56.11 ± 4.63	5.73 ± 0.524	2.89 ± 0.821	2.84 ± 0.452

The mean Trendelenburg test score before to surgery was 5.73 for the posterior group and 5.36 for the lateral group. The postoperative scores for the lateral and posterior groups were 3.28 and 2.89 respectively. The lateral group's mean test improvement was 2.08, whereas the posterior groups was 2.84. Even though the posterior group improved more than the lateral group, the p value was >0.05, which is not significant (Table 1). Evaluation of gait was performed at the end of 3 months postoperatively. The mean preoperative score was 23.58 for lateral and were 24.28 for posterior groups. Postoperatively the score was 9.12 for lateral and were 6.73 for posterior groups. The overall mean improvement in gait in the lateral group was 14.46 and 17.55 for the posterior group. Although, there is more improvement in the posterior group than the lateral, the p value was >0.05 which is not significant (Table 2).

Table 2: The comparison of mean Gait and Pain in lateral and posterior surgical approach

Surgical approaches	Gait			Pain		
	Pre-op	Post-op	Improvement	Pre-op	Post-op	Improvement
Lateral approach	23.58 ± 5.20	9.12 ± 2.12	14.46 ± 2.35	19.28 ± 4.82	38.83 ± 3.72	19.55 ± 1.05
Posterior approach	24.28 ± 5.48	6.73 ± 2.69	17.55 ± 3.66	15.56 ± 5.13	41.26 ± 4.42	25.7 ± 1.12

Prior to surgery, the mean pain levels for posterior groups were 15.56 and 19.28, respectively. The pain score following surgery was 41.26 for the posterior group and 38.83 for the lateral group. In the lateral group, the mean pain improvement was 19.55, while in the posterior group, it was 25.7. The pain score's p value was 0.05*, which is significant (table 2). Mean Function scores preoperatively were 22.43 for lateral and were 14.18 for posterior groups. Postoperative function score was

34.26 for lateral and 42.53 for posterior. Post operative assessment was done at the end of 3 months. The p value for function score was .005 both of which are significant. When compared with the preoperative hip scores, significant improvement was appreciated in the posterior group when compared to lateral group.

Discussion

In a total hip replacement, numerous surgical techniques are applied. The posterior [4] and lateral (Modified Hardinge type) [3] methods are two of the most common. Since these two procedures are the most often used and both offer sufficient exposure for complete hip replacement, we evaluated both. The posterior approach is generally considered to be easy to perform, using less extensive tissue dissection, which gives shorter operation times, and less blood loss. It allows a good exposure of the femur that may reduce the risk of femoral fracture during the procedure. It is considered to be associated with less problems with gait since the abductor muscles are not dissected. However, it is often more difficult to see the acetabulum and increased rates of dislocation have been reported [7]. It also has higher incidences of sciatic nerve injury and femoral stem loosening [8].

The direct lateral method is said to have the advantage of allowing good acetabular exposure and simplifying cup alignment, which may lower hip dislocation rates. Additionally, since the sciatic nerve is far from the surgical site, it reduces the likelihood of injury. However, there is a higher chance of harming the gluteus medius muscle and superior gluteal nerve [9], which would cause a delay in the recovery of abductor strength and a late Trendelenburg gait. Also, the supine position provides excellent exposure to the acetabulum, allows exact acetabular orientation and direct limb length measurement. Furthermore, the capsule of the hip joint is preserved. Though not confirmed there is a likelihood of heterotropic ossification with this approach.

To reduce pain and restore function, a total hip replacement is the preferred option. In 1996, Barber [2] compared the results of 21 hips that had direct lateral approaches with 28 total hip replacements that had been operated on utilising the posterior method. Different ratios of cemented and uncemented implants were employed in each method. At 2 years follow-up, no dislocations were recorded in either group. A Trendelenburg test score as well as a limp score and an abductor power score were recorded without significant differences between groups. This is the only study which assessed Harris hip score and found both groups improved their postoperative score to obtain the same mean score of 94 at the end of 2 years and found it is not significant.

In this study, the preoperative and postoperative outcomes were assessed using the Harris hip score. After three months, we evaluated the early functional results of the lateral and posterior approaches. Although the total score, as well as the functional and individual pain scores, have significantly improved, its significance is questionable. Mulliken et al (1998) [10], in a review of 770 total hip replacements via the lateral approach, found a 10% incidence of moderate or severe limp at 2 years, but there was no comparative posterior approach group. Baker and Bitounis (1989) [9] found more positive postoperative Trendelenburg tests after the lateral approach than after the posterior one and considered that this weakness was due to detachment of the gluteal flap, although they did not quantify abductor strength. In addition, violation of the ‘safe zone’ [11] within 5 cm of the greater trochanter may damage the superior gluteal nerve and thus further risk of abductor muscle weakness [12].

Baker [9] 1989, Barber [2] 1996, and Downing [13] 2001 investigated the existence of a postoperative Trendelenburg gait. These show no discernible difference between the posterior surgical approach and the direct lateral surgical approach. In our prospective study of the two approaches, we found postoperative Trendelenburg test slightly seems to favour posterior group but statistically insignificant. However, the results should be taken with care as all the patients were not compared at the same follow-up times. We have also been unable to show any significant difference in results of the Trendelenburg test between the two approaches. [14]

Conclusion

We came to the conclusion that total hip arthroplasty utilising either the lateral method or the posterior route produces equally satisfactory results for the functional outcome, gait, and Trendelenburg test.

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