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Direct anterior approach total hip replacement in a young adult: When surgical precision meets rehabilitation

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Abstract

Background: Total hip replacement surgery has proved beneficial in pain relief and functional recovery in patients with end-stage hip disease. However, in recent years, the use of the direct anterior approach has been on the rise due to its muscle-sparing technique and promise of rapid functional recovery. The direct anterior approach makes it possible for surgeons to preserve periarticular musculature, thus promoting rapid mobilization and minimizing complications in the post-op period. Younger patients undergoing total hip replacement surgery feel the need for rapid recovery of strength and function in order to attend their occupational requirements effectively. Physiotherapy has an important role in functional recovery with pain control, recovery of movements, strengthening, and gait training. There is a lack of literature regarding combined orthopedic and physiotherapeutic results in young patients undergoing direct anterior approach total hip replacement surgery.

Aim: To evaluate clinical and functional outcomes following direct anterior approach total hip replacement with structured physiotherapy rehabilitation in a young adult.

Case Presentation: A 35-year-old male patient complained of left hip pain and inability to walk for six months after a fall. His NPRS score for pain was 4/10 on rest, 9/10 on ambulation, and 8/10 on functional activity. As he did not respond well to conservative management, the patient underwent left total hip replacement using the direct anterior approach. On post-operative analysis, the patient experienced mild pain in the surgical site, difficulty in ambulating, and lack of confidence in weight-bearing on the left lower limb. On examination, there was an antalgic gait, limited and painful movements of the left hip, and decreased muscle strength (MMT 3/5) compared to the opposite limb, which had muscle strength of 5/5.

Intervention: The post-operative physiotherapy plans included strength training, mobility exercises, gait re-education, and functional training exercises tailored to the patient's needs.

Outcome Measures: The patient was assessed using an array of outcome measures which included: NPRS, Harris Hip Score, Oxford Hip Score, timed up and go test, 30 sec Chair Stand test, (HOOS) Hip Disability and Osteoarthritis Outcome Score, POMA, LEFS, Six-min Walk test, Hip Abductors Endurance test, 30 sec Chair Stand test and Timed up and go test.

Results: The patient demonstrated significant improvement on all outcome measures with reductions in pain and improved levels of mobility and independence when engaged in daily activities.

Conclusion: This case study clearly illustrates that, in a young patient, total hip replacement performed through the direct anterior approach, in association with a well-structured physiotherapy rehabilitation program, leads to successful clinical and functional recovery. The sparing nature of the direct anterior approach made a significant contribution to ease of early mobilization and successful rehabilitation of the patient. Improvement was achieved in pain, hip mobility, muscle strength, and gait deviation post-surgery. Teamwork between orthopedics and physiotherapy is important for successful patient management and achieving functional independence post-surgery.

Keywords: Direct anterior approach, total hip replacement, physiotherapy, rehabilitation outcomes postoperative recovery, hip joint surgery, functional recovery

Introduction

One of the most effective orthopaedic surgical techniques for reducing pain and regaining function in patients with severe hip joint pathology is total hip replacement (THR). Although THR has historically been linked to older adults, post-traumatic degenerative changes, avascular necrosis of the femoral head, and trauma-related hip injuries have increased the incidence of THR in younger populations [1–3]. Postoperative rehabilitation is an essential part of care because the goals of THR in young adults go beyond pain relief to include quick restoration of movement, muscle strength, gait efficiency, and long-term functional participation [4]. Early functional outcomes after THR are significantly influenced by the surgical approach chosen. Because it uses an intermuscular and inter-nervous plane to minimize disruption to important hip stabilizing muscles, especially the abductors, the direct anterior approach (DAA) has become more popular [5]. The DAA has been linked to less postoperative pain, earlier independent ambulation, a shorter hospital stays, and a lower risk of hip dislocation when compared to posterior and lateral approaches [6–8]. These traits are particularly important for young, active people who expect an early return to daily, professional, and recreational activities and place high demands on hip function.

The preservation of periarticular musculature with the DAA has significant implications for physiotherapy outcomes from the standpoint of movement and rehabilitation science. Improved gait symmetry, quicker hip strength recovery, and early weight bearing are all made possible by less muscle trauma, all of which are important factors in determining functional independence [9]. Research has shown that, when compared to traditional methods, patients undergoing DAA THR may show better early gait parameters and functional performance, especially in the early postoperative phase [10, 11]. However, without organized rehabilitation, early surgical advantages do not always translate into the best long-term results.

Physiotherapy after total hip replacement (THR) focuses on managing pain, restoring joint movement, gradually strengthening the hip and lower limb muscles, retraining neuromuscular function, and specific gait training. Common measures used in rehabilitation research, such as pain scales, mobility tests, strength assessments, and patient-reported functional scores, are key for evaluating recovery after direct anterior approach (DAA) THR [12, 13]. Although there is growing evidence showing the biomechanical and early functional advantages of the anterior approach, there is still little research combining surgical outcomes with detailed physiotherapy-led recovery, especially for young adults.

Case reports aligned with rehabilitation science offer an essential understanding of how surgical technique interacts with the movement-based recovery process. Indicated here is the purpose of this case report: to describe the clinical presentation, functional impairments, physiotherapy management, and outcomes of a young adult who underwent direct anterior approach total hip replacement, highlighting how precision in surgical intervention combined with structured rehabilitation provides impetus for restoration of movement, strength, and functional independence.

Case Presentation

A 35-year-old man had been experiencing left hip pain and walking difficulties for six months after a fall. The pain started slowly, got worse with weight bearing and walking, and limited one's ability to function. The Numerical Pain Rating Scale (NPRS) revealed that the level of pain was 4/10 when at rest, 9/10 when walking, and 8/10 when engaging in functional activities. The patient had a left total hip replacement using the direct anterior approach due to ongoing symptoms and a poor response to conservative treatment. Following surgery, the patient complained of mild pain at the surgical site, trouble walking, and decreased confidence when bearing weight on the left lower limb. A clinical examination showed an antalgic gait, restricted and painful left hip movements, mild tenderness, and a healed anterior surgical scar. The range of motion of the left hip was restricted to 30° for flexion, 0° for extension, 20° for abduction, 15° for internal rotation, and 20° for external rotation. Manual muscle testing revealed that the contralateral limb had normal strength (5/5), but the left hip musculature had decreased strength (grade 2/5). To regain strength, mobility, and functional independence, the patient was referred for structured physiotherapy rehabilitation.

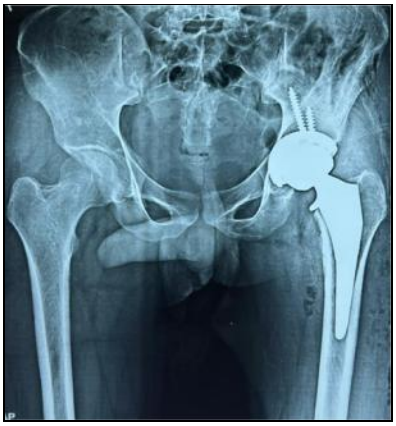


Fig 1: Pre-op X-ray

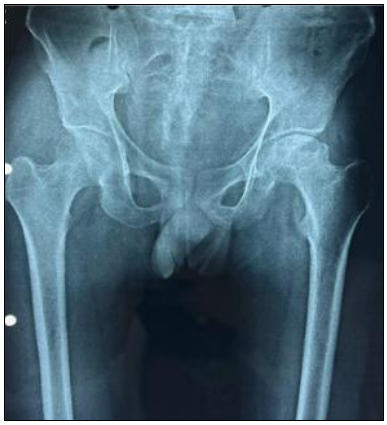


Fig 2: Post-op X-ray

Fig 3: Post-op Physiotherapy Intervention

Fig 4: Post-op Physiotherapy Intervention

Fig 5: Post-op Knee Flexion

Fig 6: Post-op Gait

Materials and Methods

The patient/guardian has been provided with comprehensive information and consent has been obtained. The patient's identity has been suitably masked.

Physiotherapy Intervention

Post-Operative Phase i

Early Phase Exercises

DAY- 0 Patient Education [14]

- Educate the patient about the condition. Tell about the Do's and Don'ts. Also, about the dislocation precautions.
- Tell the patient about the Body mechanics/posture.
- Avoid high-impact, and contact sports.
- Avoid repetitive weight lifting and activities that require twisting.

Positioning. (when the patient is in the bed) [19]

- Use of abduction wedge when in bed all the time.
- Use of trochanter roll to maintain hip in neutral rotation and promote knee extension.
- Do not place anything under the operated knee joint for the posterior precautions.
- Use of hip chair when needed.

Cryotherapy. (10 mins/2 times a day).

- Ankle toe movements. (10-15 repetitions /3-5 times/day)
- Heel Slides (10-15 repetitions /3-5 times/day)
- Supine position: External and internal rotations (10-15 repetitions /3-5 times/day.)
- Static hamstring and static Quadriceps.
- Static Gluteus exercise.(10-15 repetitions /3-5 times/day with 10 second hold).
- **Supine and sitting position:** Active Range of for hip joint (Abduction), seated hip flexion exercise [19]. 10-15 repetitions /3-5 times/day.
- Bed mobility exercises (10-15 repetitions /3-5 times/day).
- Transfer training.
- Gait training.
- Training for ADLs [16].
- Mirror-therapy [18]. (5 days/ week/4weeks)
- Music-therapy [22]. (Daily)

Phase II

Mobility Phase

Strengthening Phase

- Active range of motion exercises for hip joint. (flexion, extension, abduction, adduction) [19]
- Abductor muscle group strengthening [24] (15-20 repetitions/ 3 times/day)
- Aquatic therapy exercises (pool exercises) [21] (16 mins/ 2 week/ 3months)
- **Stretching:** Hamstring stretch, gastric/ soleus and quadriceps stretching (2-3times/3times/day/ with 30seconds hold)
- Bridging exercise in supine position [19].
- **Standing position:** Hip Range of motion exercises.
- Straight leg raises (SLR)
- Pelvic tilts on Swiss ball [19] (10 repetitions with 5 seconds hold/3-4 weeks with increasing hold duration)
- **Combined chain Exercises:** standing and squatting on Bosu ball, Mini Squats with walker, terminal knee extension, step up exercise, small lunges, toe gait, wall squats, stepping up and down the stepper forward and backward, getting up and down from chair, toe gait [19]. (15-20 repetitions/ 3 times/day/ 4 week).
- Weight shifting activities.
- Single leg stance (10-15 repetitions/3-4 weeks)
- Gait training and stair training (provide suitable device which is needed) (10-20 repetitions/2 sets /4 weeks)
- Step climbing and stepping down on a BOSU ball. (10-20 repetitions/2sets/4 weeks).
- Start with stationary bicycle with no resistance upto 4 week post-operatively.
- Treadmill training. (2-3 times/week/15-20 minute).
- Patterned electrical neuromuscular stimulation device.
- Low-frequency electrical muscle stimulator [17]. Highest intensity tolerated/5 days/week/5 weeks.
- Virtual reality balance exercises [20]. (6 weeks)
- Elliptical trainer exercise [20].
- Functional Strength Integration (FSI) Program [25].
- Necessary for early activation of hip and pelvic muscles of the surgical limb to reduce compensatory movements and enhance functional performance. (20-30minutes/1week.) Progressed to 8 RM.

Phase III

Maintainence Phase/ Home Exercises

(6-12 Weeks)

- Continue with all the range of motion and stretching exercises from phase I and phase II until total range is restored. **(**2-3 repetitions/ 1 time/day with 30 second's hold).
- All the phase II exercises adding and increasing resistance as tolerated should be continued. (3-5 times/week/3 sets/15-20 repetitions)
- Add on the resistance machines as appropriate including leg press, hamstring curl exercise.

- Static balance on BOSU BALL/ WOBBLE BOARD/ FOAM.
- Single leg stance exercise.
- **Agility exercises:** sideways walking, backward walking, forward walking, tandem-walking. [19] (10-15 repetitions/3-4 weeks)
- Continue with stationary bicycle and add resistance from mild to moderate. Start with walking program.

Phase IV
(12 Weeks and Beyond)

- Range of motion and flexibility exercises to be continued. (Daily)
- Strengthening exercises with increasing resistance and decreasing repetitions to be continued.
- All the proprioceptive exercises and improve difficulty as tolerated by patient to be continued.
- Walking, bicycle training, Activity and sports specific training exercises to be continued. (30-45 minutes/3 times/week)

- **Ergonomic Advice**
- Flexion of hip beyond 90 degrees.
- No cross leg sitting.
- Position of flexion, adduction and internal rotation.
- Knee crossing while sitting.
- Long sitting and bending forwards to touch the toes.
- Squatting on floor [23]. (At home till 2-4 months)

Follow-Up Schedule

- Visit Physiotherapy OPD at least weekly once for Follow-up, and for any complaint about pain, movement and function.
- Home Exercise Programme- Progressive increase of load [26]. (At home till 2-4 months)

Outcome Measures

1. Oxford Hip Score (OHP)
8 (Severe Hip Dysfunction) Pre-op
40 (Good Joint Function) Post-op

2. Harris Hip Score (HHP)
35 (Poor Hip Function)
88 (Excellent Outcome)

3. Hip disability and OA outcome score for Joint Replacement (HOOS)
I -15 (Severe Pain) Pre-op
II-18 (Severe Symptoms)
III- 20 (Poor Hip Related QoL)
I-85 (No pain) Post-op
II- 88 (Minimal Symptoms)
III-68 (Good QoL)

4. Lower Extremity Functional scale (LEFS)
10 (Severe Functional Limitation) Pre-op
70 (Full functional level) Post-op

5. Dynamic Gait Index (DGI)
6 (Greater Risk of Fall) Pre-op
21 (Lower Risk of fall) Post-op

6. POMA (Tinetti Performance Oriented Mobility Assessment)
14 (Moderate Fall risk) (Pre-op)
24 (low fall risk) (Post-op)

7. Six-minute Walk test
310m (Limited endurance) (Pre-op)
460m (Good Endurance) (Post-op)

8. Timed up and go test
17 sec (Impaired mobility)
9 sec (Normal mobility)

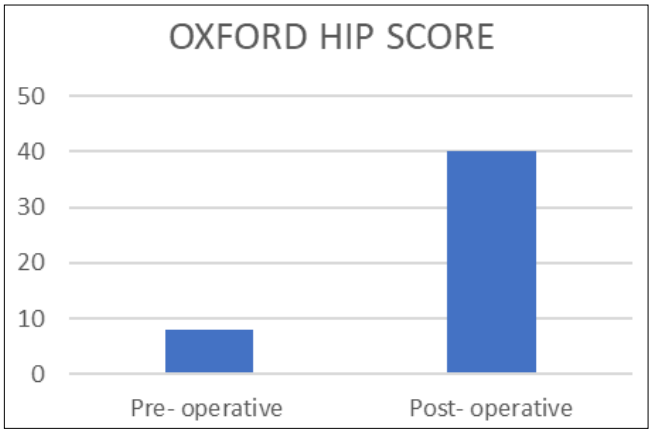
9. 30 sec Chair stand test
5 reps (markedly reduced LL strength and functional capacity)
14 reps (near-normal Functional LL strength)

10. Hip Abductor Endurance test
12 sec (Reduced Endurance)
38 sec (Significant improvement)

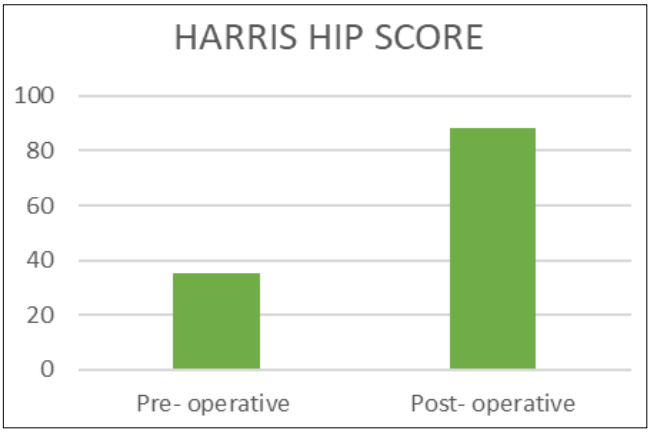
RANGE OF MOTION					
A	**Hip Joint**	**Right**	**Left (Affected)**	**Right**	**Left (Affected)**
	Flexion	0-80	0-30	0-100	0-90
	Extension	0-10	0	0-5	0-10
	Abduction	0-40	0-20	0-40	0-40
	Adduction	40-0	20-0	40-0	40-0
	Internal Rotation	0-30	0-15	0-30	0-30
	External Rotation	0-30	0-20	0-30	0-30
B	Knee Joint				
	Flexion	0-100	0-60	0-110	0-100
	Extension	100-0	60-0	110-0	100-0
C	Ankle Joint				
	Dorsiflexion	0-20	0-20	0-20	0-20
	Plantarflexion	0-40	0-40	0-40	0-40
	Inversion	0-30	0-30	0-30	0-30
	Eversion	0-10	0-10	0-10	0-10
MMT GRADING ACCORDING TO MRC					
A	Hip Joint	Right	Left (Affected)	Right	Left (Affected)
	Flexors	Grade 4	Grade 2	Grade 5	Grade 5
	Extensors	Grade 4	Grade 2	Grade 5	Grade 5
	Abductors	Grade 4	Grade 2	Grade 5	Grade 5

	Adductors	Grade 4	Grade 2	Grade 5	Grade 5
	Internal Rotators	Grade 4	Grade 2	Grade 5	Grade 5
	External Rotators	Grade 4	Grade 2	Grade 5	Grade 5
B	Knee Joint				
	Flexors	Grade 4	Grade 3	Grade 5	Grade 5
	Extensors	Grade 4	Grade 3	Grade 5	Grade 5
C	Ankle Joint				
	Dorsi-flexors	Grade 4	Grade 3	Grade 5	Grade 5
	Plantar-flexors	Grade 4	Grade 3	Grade 5	Grade 5
	Invertors	Grade 4	Grade 3	Grade 5	Grade 5
	Evertors	Grade 4	Grade 3	Grade 5	Grade 5

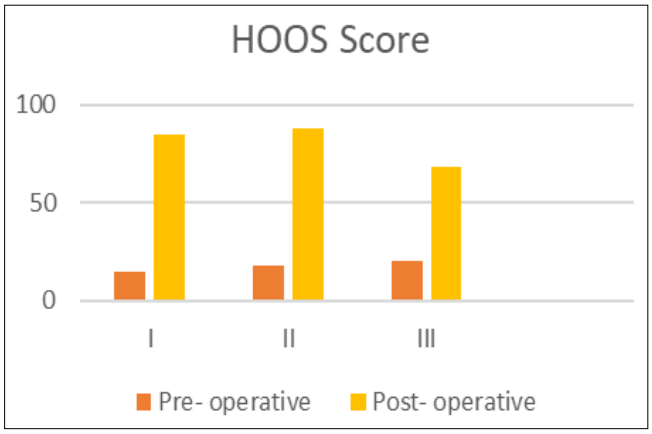
Results



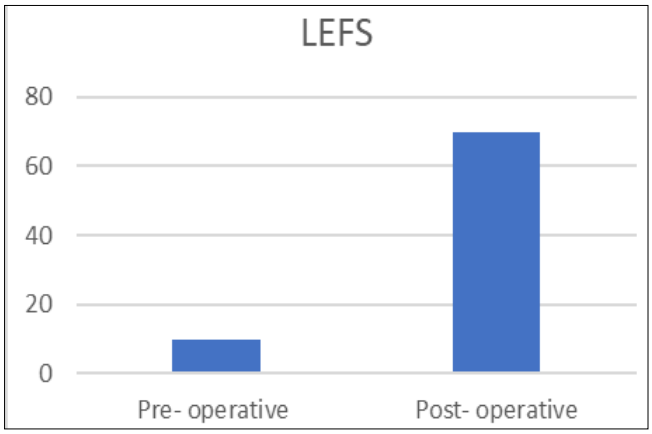
Graph 1: Pre- Post op Oxford Hip Score



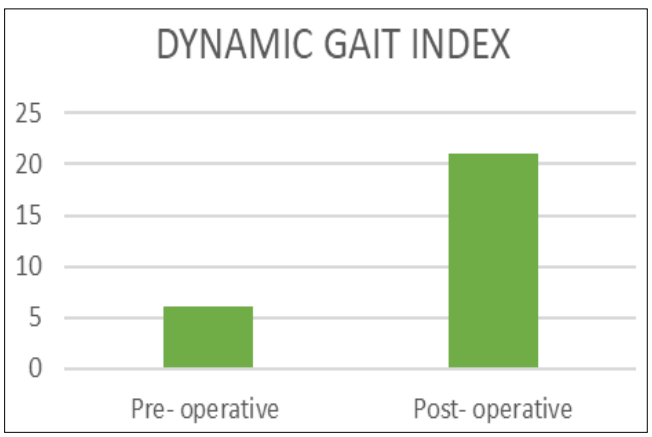
Graph 2: Pre- Post op Harris Hip Score



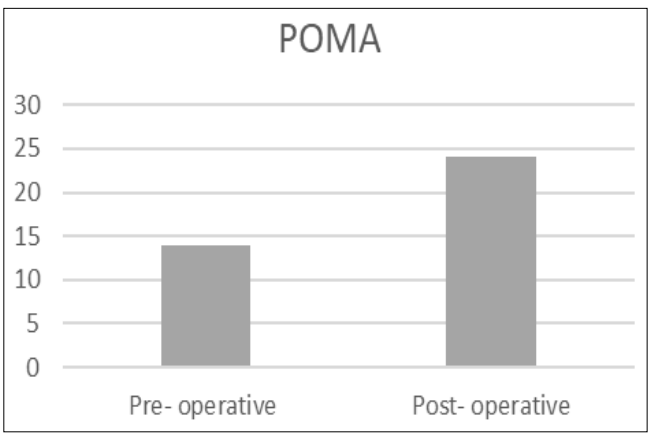
Graph 3: Pre- Post-Op HOOS Score v



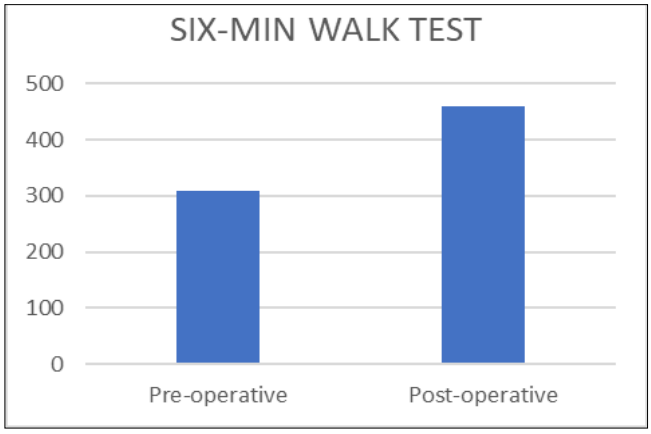
Graph 4: Pre- Post Opp LEFS



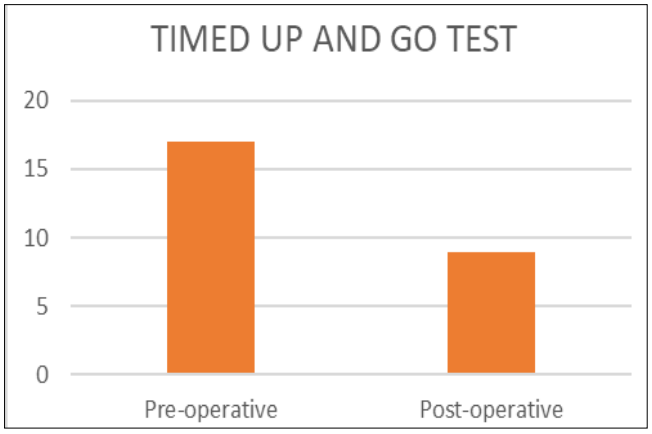
Graph 5: Pre-Post op DGI



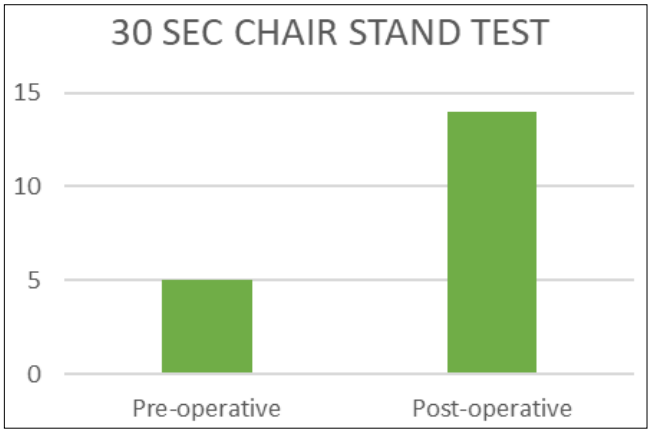
Graph 6: Pre- post-op Tinetti POMA Scale



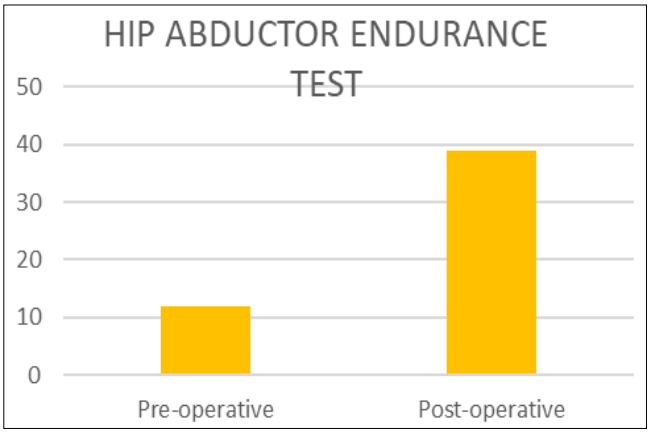
Graph 7: Pre-post-op Six-min Walk test Score



Graph 8: Pre-Post-op TUG Score



Graph 9: Pre-post-op 30 sec Chair Stand Test



Graph 10: Pre-post-op Hip Abductor Endurance Test

Discussion

The current case showed a significant improvement in pain, hip function, walking, and balance after a direct anterior approach (DAA) total hip replacement combined with structured physiotherapy rehabilitation. This finding aligns with recent evidence about the benefits of the muscle-sparing anterior approach. Studies published in 2024 and 2025 reported that DAA THR leads to less early post-operative pain, quicker mobilization, and faster recovery, especially during the initial rehabilitation phase. This supports the early improvements seen in this young patient. Improvements in hip-specific outcome measures like the Oxford Hip Score, Harris Hip Score, and HOOS are consistent with recent research showing better functional gains and patient-reported outcomes after DAA, particularly in younger, more active individuals [2, 5]. Furthermore, as evidenced by improvements in the Dynamic Gait Index and POMA scores, the observed improvement in gait stability and balance highlights the importance of early mobilization and task-specific gait training, which are highly recommended in recent physiotherapy and rehabilitation guidelines following THR [6, 7].

Results from recent rehabilitation-focused studies have also consistently demonstrated that an appropriate structured and progressive physiotherapy regime aimed at improving muscle strength, joint movement, and retraining functionality will help achieve the maximum benefit of a surgical procedure as well as restoring independent ability Although DAA has some advantages over traditional, direct anterior approaches (eg, less blood loss), there is growing evidence in the literature that the results from DAA procedures are significantly affected by the skill of the surgeon performing them and by the quality of the rehabilitation received after the surgery, thus underscoring the need for a collaborative orthopaedic/physiotherapy effort, especially for young adults who have undergone a total hip replacement procedure [1, 9].

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Conclusion

This case study clearly illustrates that, in a young patient, total hip replacement performed through the direct anterior approach, in association with a well-structured physiotherapy rehabilitation program, leads to successful clinical and functional recovery. The sparing nature of the direct anterior approach made a significant contribution to ease of early mobilization and successful rehabilitation of the patient. Improvement was achieved in pain, hip

mobility, muscle strength, and gait deviation post-surgery. Teamwork between orthopedics and physiotherapy is important for successful patient management and achieving functional independence post-surgery.

Acknowledgement
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References

1. Learmonth ID, Young C, Rorabeck C. The operation of the century: Total hip replacement. Lancet, 2007.
2. Mont MA, Hungerford DS. Nontraumatic avascular necrosis of the femoral head. J Bone Joint Surg Am, 1995.
3. Dorr LD, Takei GK, Conaty JP. Total hip arthroplasty in patients younger than 45 years. J Bone Joint Surg Am, 1983.
4. Zeni J Jr, Snyder-Mackler L. Most patients gain weight in the first year after total hip arthroplasty. Phys Ther, 2010.
5. Light TR, Keggi KJ. Anterior approach to hip arthroplasty. Clin Orthop Relat Res, 1980.
6. Barrett WP, Turner SE, Leopold JP. Prospective randomized study of direct anterior vs posterior THA. J Arthroplasty, 2013.
7. Petis SM, Howard JL, Lanting BL, Vasarhelyi EM. Surgical approach in total hip arthroplasty. Can J Surg, 2015.
8. Sheth D, Cafri G, Paxton EW, Namba RS. Anterior vs posterior THA outcomes. J Bone Joint Surg Am, 2015.
9. Meneghini RM, Pagnano MW. Muscle damage in minimally invasive THA. J Arthroplasty, 2006.
10. Queen RM, Appleton JS, Butler RJ, *et al*. Early gait mechanics following anterior THA. Clin Biomech. 2011.
11. Zeni J Jr, Flowers P, Bade M. Rehabilitation after total hip arthroplasty. J Orthop Sports Phys Ther. 2018.
12. Pozzi F, Snyder-Mackler L, Zeni J Jr. Physical therapy after THA: A systematic review. Phys Ther. 2013.
13. Bade MJ, Stevens-Lapsley JE. Early high-intensity rehabilitation after joint arthroplasty. J Orthop Sports Phys Ther, 2012.
14. Elmoghazy AD, Lindner N, Tingart M, Salem KH. Conventional versus fast track rehabilitation after total hip replacement: A randomized controlled trial. Journal of Orthopaedics, Trauma and Rehabilitation, 2022, 29(1). doi:10.1177/22104917221076501
15. Konnyu KJ, Pinto D, Cao W, Aaron RK, Panagiotou OA, Bhuma MR, *et al*. Rehabilitation for Total Hip Arthroplasty: A Systematic Review. Am J Phys Med Rehabil,2023:102(1):11-18. doi: 10.1097/PHM.0000000000002007. Epub 2022 Mar 12. PMID: 35302955; PMCID: PMC9464790.
16. Style Dudoniene, Vilma, Adomaitytė, Andrė, Žlibinaitė, Laura, *et al*. 'Randomized Controlled Trial to Compare Conventional Physiotherapy with Task-oriented Exercises after Total Hip Replacement', 2023, 947 – 955.
17. Zhao Y, Zhang B, Wang Y, Liu J. Effectiveness of Neuromuscular Electrical Stimulation for Enhanced Recovery After Total Hip Replacement Surgery: A Randomized Controlled Trial. Geriatric Orthopaedic Surgery Rehabilitation, 2022, 13. doi:10.1177/21514593221129528
18. Darnall BD. Self-delivered home-based mirror therapy for lower limb phantom pain. Am J Phys Med Rehabil,2009:88(1):78-81. doi: 10.1097/PHM.0b013e318191105b. PMID: 19096290; PMCID: PMC4793906.
19. Choubisa CA, Hege AR, Phansopkar P. Physiotherapy Rehabilitation Post Total Hip Replacement in the Case of Avascular Necrosis of the Femur: A Case Report. Cureus,2023:15(1):e33465. doi: 10.7759/cureus.33465. PMID: 36756016; PMCID: PMC9902054.
20. DOI: https://doi.org/10.12965/jer.2346290.145
21. Peng MS, Wang R, Wang YZ, Chen CC, Wang J, Liu XC, *et al*. Efficacy of Therapeutic Aquatic Exercise vs Physical Therapy Modalities for Patients With Chronic Low Back Pain: A Randomized Clinical Trial. JAMA Netw Open,2022:5(1):e2142069. doi: 10.1001/jamanetworkopen.2021.42069. PMID: 34994794; PMCID: PMC8742191.
22. Patiyal N, Kalyani V, Mishra R, *et al*. Effect of Music Therapy on Pain, Anxiety, and Use of Opioids Among Patients Underwent Orthopedic Surgery: A Systematic Review and Meta-Analysis. Cureus,2021:13(9): e18377. DOI 10.7759/cureus. 18377
23. Essentials of orthopedics John Ebnezar Rakesh John 3rd edition.
24. Ismailidis P, Kvarda P, Vach W, Cadosch D, Appenzeller-Herzog C, Mündermann A, *et al*. Abductor muscle strength deficit in patients after total hip arthroplasty: a systematic review and meta-analysis. The Journal of arthroplasty,2021:36(8):3015-27.
25. Judd DL, Cheuy V, Peters A, Graber J, Hinrichs-Kinney L, Forster JE, *et al*. Incorporating functional strength integration techniques during total hip arthroplasty rehabilitation: a randomized controlled trial. Physical therapy,2024:104(3):pzad168.
26. Madara KC, Marmon A, Aljehani M, Hunter-Giordano A, Zeni Jr J, Raisis L, *et al*. Progressive rehabilitation after total hip arthroplasty: a pilot and feasibility study. International journal of sports physical therapy,2019:14(4):564.