

Rehabilitation of total hip arthroplasty

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ABSTRACT

THA, which is among the most frequently performed surgical procedures in the world; It is indicated for many diseases affecting the hip joint, especially for persistent pain that occurs at rest and at night and is unresponsive to conservative treatment. In this surgery, where cement, cementless and hybrid models are used, the existing methods have advantages and disadvantages compared to each other. However, no matter which method is used, patients should be followed carefully after the operations for possible complications. The surgical method applied may cause some differences in the rehabilitation process, and it is very important to pay attention to these differences in the treatment program.

Keywords: Total hip arthroplasty, hip, arthroplasty, rehabilitation

INTRODUCTION

Arthroplasty; it can be broadly defined as a reconstructive surgical intervention performed to correct the structure or function of a joint. Total hip arthroplasty (THA) has become one of the most frequently performed surgical procedures in the world. The main indication for Total Hip Arthroplasty has been reported as persistent pain that occurs outside of movement, at rest and at night, and is unresponsive to conservative treatment. The second reason is defined as the presence of severe or complete limitation of movement accompanied by pain, and as a result, the patient's daily life and work activities are negatively affected and the quality of life is impaired.

INDICATIONS OF TOTAL HIP ARTHROPLASTY

The indications for total hip arthroplasty are very broad. Total hip arthroplasty can be applied in many diseases that cause hip pain and movement limitation.

Among these indications;¹⁻³

- Osteoarthritis (primary, secondary) (Figure 1)
- Inflammatory arthritis (rheumatoid arthritis, ankylosing spondylitis)
- Femoral head avascular necrosis (Figure 2)
- Pyogenic arthritis or osteomyelitis
- Hip joint tuberculosis
- Bone tumors

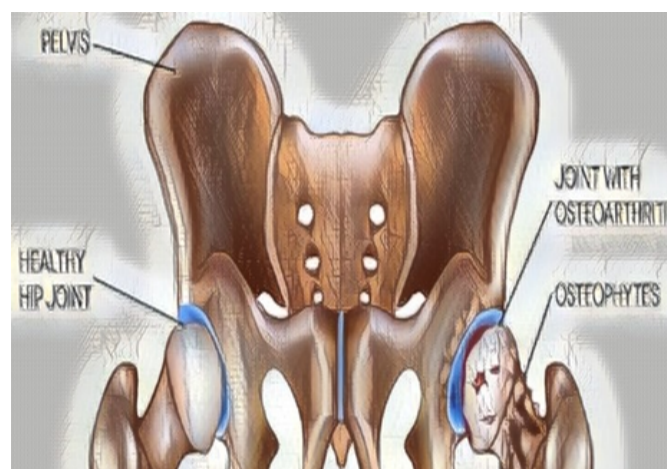


Figure 1. Osteoarthritis (primary, secondary)

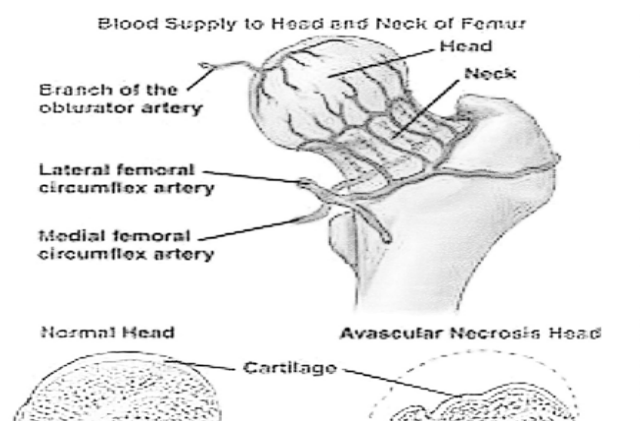


Figure 2. Femoral head avascular necrosis

- Hereditary diseases
- Previous unsuccessful/complicated hip operations
- Hip osteotomies
- Slipped capital femoral epiphysis; can be shown.¹

CONTRAINDICATIONS OF TOTAL HIP ARTHROPLASTY

An active infection in the hip or other site, an unstable systemic disease that may increase morbidity and mortality; While it is considered as an absolute contraindication, any disease that rapidly destroys the bone, neuropathic arthropathy, abductor group muscle weakness and rapidly progressing progressive neurological disorders can be considered as relative contraindications.²

PREOPERATIVE EVALUATION IN TOTAL HIP ARTHROPLASTY

Careful evaluation of the patient before surgery is important in terms of complications. The most important point here is whether the level of pain requires such an elective operation. The patient's life expectancy and post-surgical expectation should also be taken into consideration. It is essential to make a comprehensive pre-operative evaluation, including laboratory tests. The medications used by the patient and his/her allergy history should be taken into consideration. Pyogenic skin infections must be treated. Likewise, genitourinary and dental problems should be resolved. During physical examination, the strength of the abductor muscles should be evaluated with the Trendelenburg test. If hip and knee replacement on the same side is required, the hip should be operated on first. In bilateral hip involvement, priority should be given to the painful one, and after 3 months or more, the other hip must be operated on. When a unilateral operation is performed, both hips can be operated in the same session in the presence of bilateral serious limitations and deformities that will affect the rehabilitation process. It has been shown that there are significant improvements in parameters such as pain, function, range of motion and psychosocial status in patients who practice exercises and receive training in the preoperative period.³⁻⁵

SURGICAL TECHNIQUES IN TOTAL HIP ARTHROPLASTY

There are three different methods used for component detection in Total hip arthroplasty. These are cemented (cemented), cementless (cementless) and hybrid model method. Both methods have advantages and disadvantages over the other. Operation with or without cement may affect the limitations regarding load bearing (Figure 3, Figure 4).

Total hip arthroplasty is one of the operations with the highest patient satisfaction. However, it should not be forgotten that postoperative complications such as thromboembolism, periprosthetic infection, hip dislocation, osteolysis and mortality may occur. Many studies comparing postoperative complications and mortality rates between operations performed with and without cement; It shows that there are no significant differences in the risks of mortality and postoperative complications between the two methods.^{1,2-6-9}

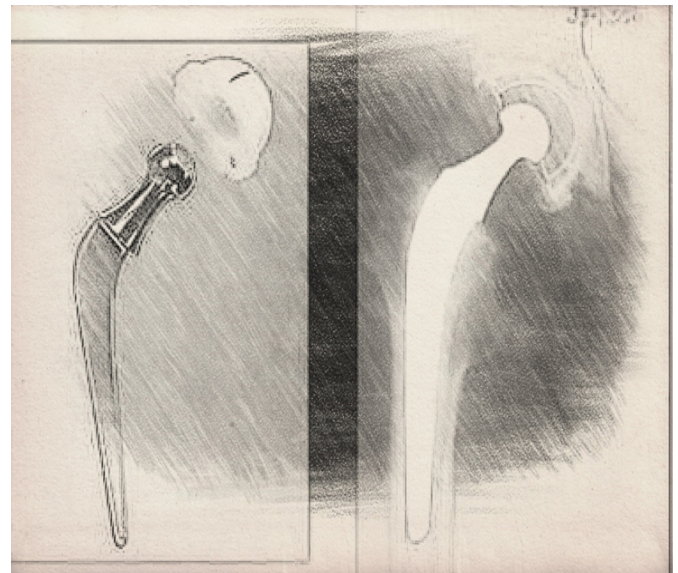


Figure 3. Operation with cement may affect the limitations regarding load bearing

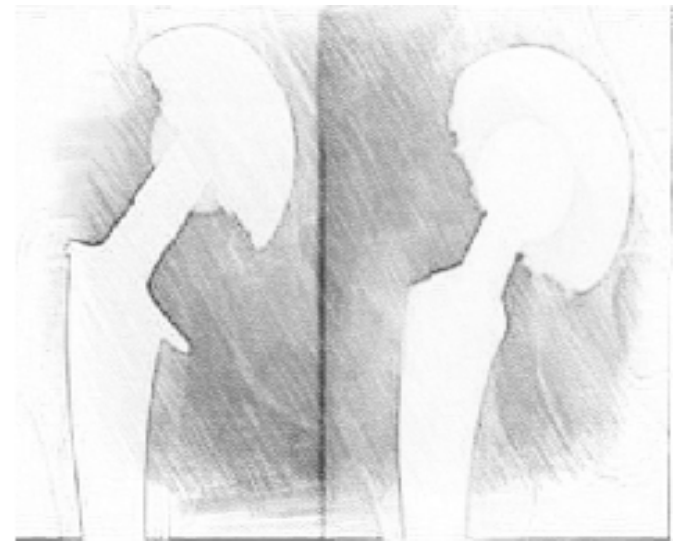


Figure 4. Operation without cement may affect the limitations regarding load bearing

REHABILITATION GOALS

The main rehabilitation goals in total hip arthroplasty are;

- Taking precautions against dislocation of the prosthesis,
- Mobilizing the patient as early as possible,
- To take precautions against complications that may be caused by long-term immobilization (deep vein thrombosis, pulmonary embolism, pressure sore, pneumonia),
- Ensuring independent transfer and ambulation with assistive walking devices,
- To provide pain-free hip joint movement within the permitted ROM degrees,
- Strengthening the muscles around the hips
- It can be considered as increasing the functional level of the patient to enable him/her to be independent in daily living activities and work life.¹

If there is no special contraindication, full load pressing and ambulation are aimed for cemented prostheses starting from

the 3rd day. In cementless prostheses, the initial fixation of the implant is in the form of press fit. For this reason, maximum strength can only be achieved after sufficient bone advancement into the implant. Although it is thought that there is a sufficiently strong fixation at the end of the 6th week, maximum stability only occurs after 6 months.^{1,2}

Total hip arthroplasty rehabilitation is very important to maximize functional level as soon as possible, especially in elderly patients.

POST-OPERATIVE REHABILITATION PROGRAM

Highlights;

- Initial muscle strength assessments,
- Sitting-standing transfers
- It includes balance and walking training.
- Transfer and walking training exercises are progressed depending on the patient's age, weight-bearing status, preoperative ambulation level and degree of recovery, and the transition is made from simple walking to climbing obstacles and ramps according to the patient's needs.
- Therapeutic exercises initiated at the first visit should include lower extremity isometric exercises (quadriceps, hamstring, and gluteal sets) and ankle pumping exercises.

On the 2nd day; while continuing the previous exercises, range of motion (ROM) exercises and heel slide exercises are performed within the allowed limits in the supine position.

On the 3rd and 4th days; it is recommended to perform long arc quadriceps exercises with heel lift in a sitting position along with the previous exercises.

5-7. days; mini squats, 90 degree hip flexion, standing hip extension, and stepping forward are added to these exercises.

SITUATIONS TO BE CAREFUL DURING THE REHABILITATION PROGRAM

In the straight leg lifting exercise, a load of at least 1.5 times the body weight is created. For this reason, it should be applied when partial and full load bearing are passed. If pain occurs, it is recommended to place a support under the knee to reduce the stress on the hip and perform hip flexion and knee extension exercises separately. In the operated hip, the quadriceps is atrophic and the thigh flexors are weak. Even isometric contractions of the hip abductors should be performed very carefully during trochanter osteotomy. When climbing stairs, first the healthy leg, then the operated leg, and finally the crutches are carried to the upper step. When going down the stairs, the crutches are taken down first, then the operated leg, and lastly the healthy leg.

The amount of load to be given to the operated extremity should be determined according to the type of fixation of the components and the presence of trochanteric osteotomy or bone graft. It should not be forgotten that restrictions such as fingertip weight bearing or partial weight bearing applied after arthroplasty directly affect the level of functional independence after surgery. Although partial weight bearing

represents 30%-50% of body weight, studies show that patients have difficulty in achieving this ratio. More than 10% of the body weight should not be applied during fingertip weight bearing.²

Weight bearing is of great importance for the exercise program to be applied to the patient. In the studies, the effects of the exercises performed with and without weight on functional performance, Harris hip score, muscle strength and muscle thickness were investigated. The results obtained showed that weight-bearing exercises were superior.¹⁰

POST-OPERATIVE REHABILITATION STEPS

It is very important to achieve rehabilitation goals after surgery. The rehabilitation program goals are summarized below;²

- At the end of the 6th post-operative week, full range of motion is achieved within the allowed limits; For example, in a patient undergoing a posterior approach, an attempt is made to achieve 90 degrees of flexion and 40 degrees of abduction at the hip.
- At the end of the 6th week, patients can drive and lie on the operated hip.
- After post-operative restrictions are removed, joint range of motion (ROM) can be increased to a better level with stretching exercises.
- In the next stage, functional strengthening is aimed with closed kinetic chain exercises and balance exercises.
- While independent ambulation is aimed at the 12th week, it is aimed to return to recreational and sports activities at the end of the same week.²

Things to Consider During Ambulation

After Total hip arthroplasty, the patient's gait pattern should be monitored after full load mobilization. The most important condition that will cause gait disorder in these patients is shown to be hip flexion. To prevent flexion contracture, it is useful to apply gentle stretching in the direction of hip extension by hanging the operated extremity down in the supine position. Again, in some studies, it has been reported that in cases where a cane is not used, the abductor muscles tend to directly overlap the trochanter major in order to balance the body weight of the patients, so the patient should walk with cane support for at least 6 months, even if his gait is smooth.¹

Resistive Exercises

In the first year after Total hip arthroplasty, the deficits in the affected hip are 1-21% of the contralateral hip. Post-operative power loss; It is thought to be independent of hip pain, systemic infections and thigh edema. These approaches to prevent weakness and atrophy should be started immediately after surgery.

The maximum strength increase gained through resistive exercises after Total hip arthroplasty can be achieved within 4-5 weeks, and there are studies showing that the gain in strength increase can continue even after 11 months. It is thought that functional parameters such as walking

speed and stair climbing time are significantly improved by resistive exercises. In a study comparing resistive exercises, neuromuscular electrical stimulation (NMES) and conventional rehabilitation in patients undergoing THA, it was found that the hospital stay was significantly shortened in the group receiving resistive exercise.¹¹

RETURNING TO SPORTS AFTER TOTAL HIP ARTHROPLASTY

In general, after Total Joint Replacement surgery, the return to sports and physical activities increases noticeably 1 year after the surgery. However, it should not be forgotten that the level of 5 years before the operation cannot be reached. And this situation varies from person to person.. The effect of physical activity on the durability of total hip arthroplasty cannot be denied. Exercise and physical activity are essential for maintaining overall health. While some sports activities can be done safely (Cycling(Most patients with previous cycling experience can cycle again within 3-6 months after total joint arthroplasty.), Bowling, Golf, Rowing, Sailing, Swimming, Walking, Aerobic exercises), some sports activities are controversial (Ballet, Fencing, Jogging, Tennis, Table tennis). Some sports are definitely not recommended (Basketball), Football, Karate, Volleyball, Baseball).^{17,19-20}

COMPLICATIONS OF TOTAL HIP ARTHROPLASTY

This complications are below;^{2,12,13-16,18}

1. Mortality (reported as 0.33% for primary total hip arthroplasty and 0.84% for revision surgery)
2. Hematoma formation
3. Heterotopic ossification: Although heterotopic ossification (HO) is very common after Total hip arthroplasty, it rarely causes any symptoms. HO usually presents clinical findings as pain, stinging, jumping, tightness, instability and limitation of movement in the hip joint. Male gender, presence of enthesopathy, presence of ankylosing spondylitis or hypertrophic arthritis, presence of brain injury, presence of diffuse idiopathic skeletal hyperostosis, post-traumatic osteoarthritis, conversion of hip ankylosis to prosthesis, anterior and lateral hip approach, wide dissection and presence of preoperative HO, postoperative HO increases the risk for development).
4. Thromboembolism
5. Nerve injuries (there is a risk of nerve paralysis of 0.5% after primary total hip arthroplasty and 3.5% after revision surgery. Sciatic, femoral, obturator and superior gluteal nerves may be injured)
6. Vascular injuries
7. Limb length differences
8. Instability and Dislocations: Dislocations are shown as the most common reason for revision of total hip arthroplasty after aseptic loosening. Research has

shown that the instability rate range after primary Total hip arthroplasty performed due to different etiologies is 0.5-11%, and the instability rate range in Total hip arthroplasty performed due to primary coxarthrosis is 0.3-3%.

9. Fractures (Femur and acetabulum fractures can occur during or after surgery. Women, elderly patients, patients with inflammatory arthritis, osteoporosis,(Patients with osteoporosis have a higher risk of periprosthetic fracture) and metabolic diseases increase the risk of fractures.)
10. Infection (Treatment options for periprosthetic joint infection occurring after Total Hip Arthroplasty include antibiotic treatment, surgical debridement, single-stage revision, double-stage revision and resection arthroplasty/amputation.)
11. Relaxation (Figure 5)
12. Osteolysis can be considered

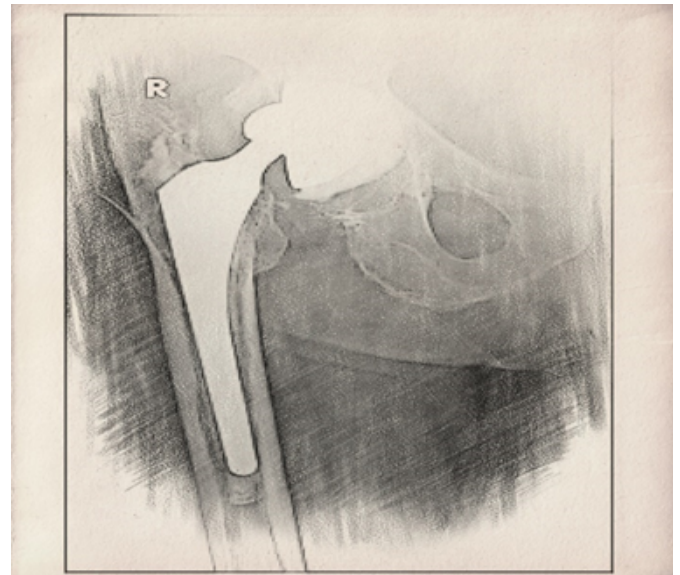


Figure 5. Relaxation

CONCLUSION

Arthroplasty, in its broad sense, is a surgical intervention performed to correct the structure or function of a joint. It is necessary to determine the right patient and the right indications before Total Hip Arthroplasty. A significant increase is observed in Daily Living activities of patients whose post-operative rehabilitation process is successful.

ETHICAL DECLARATIONS

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

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Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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