



## RESEARCH ARTICLE

### A WOMAN OBTAINS RELIEF FROM EXCRUCIATING HIP JOINT PAIN ATTRIBUTABLE TO MULTIDISCIPLINARY TEAMWORK AND ADHERENCE TO PHYSIOTHERAPEUTIC INTERVENTIONS: A SINGLE CASE STUDY OF TOTAL HIP REPLACEMENT

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#### ABSTRACT

Hip replacement aims to alleviate hip pain due to the damaged joint and ensure smooth mobility to the extent possible. Physiotherapeutic support after the hip replacement helps in ensuring proper rehabilitation and optimum quality of life. This was amply demonstrated in a single case of avascular necrosis of the femoral head in a 31-year-old woman. She had been suffering from pain and stiffness in the right hip joint for the last 20 years. She was referred to a tertiary care hospital where the orthopedic surgeon conducted the hip replacement surgery. A multidisciplinary team including the surgeon, nurse practitioner, and physiotherapist handled the case resulting in an almost normal life for the sufferer.

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## INTRODUCTION

The hip joint, a ball and socket joint, is one of the largest joints in our body<sup>1</sup>.

- The ball is the femoral head, which is the upper end of the femur (thigh bone).
- The socket is formed by the acetabulum, which is the part of the pelvis bone.

The bone surfaces of the ball and socket are covered with articular cartilage, a smooth tissue that cushions the ends of the bones and enables them to move easily (Fig-1). A thin synovial membrane also surrounds the hip joints. In a healthy hip, this membrane makes a small amount of fluid that lubricates the cartilage and eliminates almost all friction during hip movement. Bands of tissue called ligaments (the hip capsule) connect the ball to the socket and provide stability to the joint.

The wear and tear rate is also very high in hip joints. Often it leads to joint damage making it non-functional in many cases, joint replacement is the only remedy<sup>2</sup>.

Total hip replacement/arthrosis (THA/THR) is a surgical procedure in which the hip joint is replaced by an artificial implant called a hip prosthesis. Such replacement of joints in orthopedic surgery is generally conducted to relieve pain or when the bone is fractured. THA replaces both the acetabulum and the femoral head while hemiarthroplasty typically only replaces the femoral head. Hip replacement is one of the most common orthopedic surgeries, though patient outcome and satisfaction vary widely<sup>3</sup>. THA is most used when other osteoarthritis treatments of the hip joints fail. Other indications include rheumatoid arthritis, avascular necrosis, traumatic arthritis, protrusion-acetabula, certain hip fractures, benign and malignant bone tumors, arthritis associated with Paget's disease, ankylosing spondylitis, and juvenile rheumatoid arthritis<sup>4</sup>. The procedure aims to relieve pain and improvement in hip joint function. For a young patient, THA is usually considered only after other therapies including physiotherapy and pain medications, have failed<sup>5</sup>. But physical therapy is very very important in the pre- and post-operative stages to maintain normal function as much as possible. In addition, it is better to try to save as much of the bone as possible.

The reason for this is that if the hip replacement subsequently needs revising after some years, more bone is available to fix the revision implant. Hip resurfacing is an example of a bone-conserving implant. Complications and risks in the case of hip replacement are the same as any other joint replacement, which includes infection<sup>6</sup>, dislocation, limb length discrepancy, loosening, impingement, osteolysis, metal sensitivity, nerve palsy, chronic pain, and death. Oedema occurs around the hip joint in the post-operative stage which usually disappears in the next 7 days.

As the anatomical characteristic of the short external rotators, the root of the internal obturator muscle is connected to the levator ani muscle. Among the pelvic floor muscles, this levator ani muscle is closely involved in supporting the pelvic organs. Since the short external rotators may have been atrophied due to hip joint dysfunction before surgery, if the strength of this muscle group recovers, support of the pelvic organs and urinary incontinence may be improved. It was assumed that surgery through an anterior approach (AA) improved external rotation contracture of the hip joint and leg length, which increased tension of the internal obturator muscle, which helps pelvic floor muscle tension increase and ultimately improved urinary incontinence. Some patients with hip osteoarthritis report that urinary incontinence (UI) is improved following total hip arthroplasty (THA). However, the type and severity of UI remain unclear. Some studies hypothesized that both stress urinary incontinence (SUI) and urge urinary incontinence (UUI) are improved after THA. It has assessed the characteristics of UI and discusses the anatomical factors related to UI and THA for improved treatment outcomes<sup>8,9</sup>.

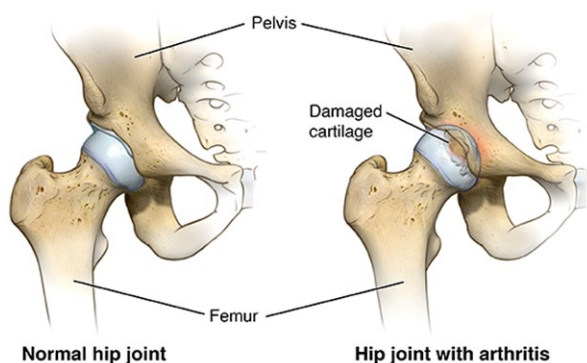


Figure-1

**There are several reasons why orthopedic surgeons may recommend total hip replacement surgery.** People who benefit from hip replacement surgery often have<sup>5</sup>:

- Hip pain that limits everyday activities, such as walking or bending,
- Hip pain that continues while resting, either during the day or at night,
- Stiffness in the hip that limits the ability to move or lift the leg,
- Inadequate pain relief from anti-inflammatory drugs, physical therapy, or walking supports

#### Types of hip replacement:

- Total and Partial Hip Replacement,

- Anterior, Posterior, and Lateral Hip Replacement,
- Traditional and Minimally Invasive Hip Replacement,

#### Management available for THR (Other than surgery)<sup>10,11,12,13,14</sup>:

Exercise is most important to home care, particularly during the first few weeks after surgery. The patient should be able to resume most normal light activities of daily living within 3 to 6 weeks following surgery. Some discomfort with activity and at night is common for several weeks.

The activity/exercise program should include: The physical therapist will recommend exercise for 20 to 30 minutes a session, and 2 to 3 sessions daily during the post-operative or early recovery stage. In the early post-operative stage: The following exercises will help increase circulation to the legs and feet, which is important for preventing blood clots and swelling. They will also help to strengthen muscles and improve hip movement. Start the exercises as soon as patients can feel so to do. Patients can begin them in the recovery room shortly after surgery. Patients may feel uncomfortable at first, but these exercises will enhance recovery and diminish post-operative pain.

#### The following exercises are recommended

- Ankle Pumps-Begin this exercise immediately after surgery and continue until you fully recover
- Ankle rotations
- Bed-supported knee bends and sliding of foot in the bed.
- Buttock contractions
- Hip abductions
- Quadriceps exercise
- Straight Leg Raising (SLR)

#### Standing knee raises

- Standing hip abduction
- Standing hip extension

#### Early activities

- A graduated walking program i.e. initially in the home and later outside and then to slowly increase mobility.
- Resuming other normal household activities, such as sitting, standing, and climbing stairs.
- Specific exercises several times daily to restore movement and strengthen the hip area. Patients probably will be able to perform the exercises without help, but patients should have a physical therapist who will help them at home or in a therapy center during the first few weeks after surgery

#### Advanced exercise and activities

- Exercise with the help of therabands, tubes, cycling, treadmill, etc, and of course under the guidance of a specialist, i.e., a Physiotherapist.

Chronic hip pain because of necrosis of the hip joint is a complicated problem, which may be more complex if surgery is not performed at the correct time. However, patients can achieve good results if he or she can adhere to the

physiotherapeutic program advised in the pre-and post-operative stages.

**The Following Case Report amply demonstrates it.**

**Case Report:** A 31-year-old woman has had pain and tightness in the right hip joint for the last 20 years. She resides in Himachal Pradesh, a hilly area where she must walk on uneven ground. She used to take painkillers from the local doctor which gave her temporary relief. Her physical condition worsened day by day because of pain and stiffness. She started to limp for the last 2 years (before surgery) which makes her unstable during walking. The conditions worsened during this period when the local doctor referred her to Medical College, Shimla. Doctors of the Shimla Medical College started giving her medications which did not show much improvement. Even her condition was worsening gradually. So, they referred her to PGIMER, Chandigarh a tertiary care hospital for further management.

**History of past illness:** The patient had a fall while she was performing her household work at the age of 11 years (2000). She got an injury on her right hip joint and developed pain and swelling on that same side. She then visited the local civil hospital and detailed investigations were carried out including X-rays, blood tests, etc. and medications were started for a longer period as per the patient's version. She was informed that she developed an infection in the hip joint (right). As she stays in a hilly area, the doctor advised her to take complete bed rest for 1 month to avoid further injury.

She continued her treatment for the next 3 months continuously when administered 90 injections of a kind of antibiotic regularly (as per her version). Gradually she partially recovered from the pain, swelling, and stiffness. She started normal schooling and household work with mild to moderate level difficulties. She had to walk on the uneven road for her normal routine work as her residence was in a hilly area. She completed her education in this situation. She got married in the year 2009 and was leading her life with mild to moderate level difficulties. She delivered a baby girl normally in the year 2011. However she had some problems concerning daily activities, raising the baby, and specially the activities which required sitting on the ground. Her problem started increasing again for which she was referred to Shimla Medical College from the local hospital. Doctors from Shimla Medical College started giving medications and advised her to do a few exercises. But there was no relief from the pain and stiffness. So the doctors advised her to have surgery for better results. However, she was not interested in undergoing surgery and reported to the orthopedic department of PGIMER, Chandigarh for further management in the year 2012. The doctors from PGIMER, Chandigarh started giving medications and advised physiotherapeutic management also. She was feeling better with the help of medicine and physiotherapy till 2015.

In between the time she started a business (Boutique) to support her family along with the other household work. But in this business, she needed to run a sewing machine where her knee and hip movement were important. She was continuing the business along with the help of supporting staff. But, gradually her problems started increasing because of all

these activities. So, she continued her treatment in the PGIMER, Chandigarh.

**Management done in PGIMER, Chandigarh:** The orthopedic surgeon of PGIMER, Chandigarh checked the patient thoroughly. Different investigations and an X-ray of the right hip joint were taken. X-ray showed necrotic changes in the head of the right hip joint. However, she continued her treatment with the help of medicine and physiotherapy. But in the year 2015, her problems were gradually deteriorating especially in respect of movement of the hip joint. In the next 3 years, her condition deteriorated very badly in respect of the movement and flexibility of her right hip joint. In 2018, the orthopedic surgeon advised the patient that surgery was the only remedy in this situation. The patient accepted the orthopedic surgeon's decision and was admitted for hip joint surgery.



**Figure -2, Post op. X-Ray (Rt hip joint)**

The surgery was carried out in July 2018. It was decided to do the total hip replacement (Fig-2) as the joint movement was almost negligible. The joint surface was damaged on the femoral head and the acetabular surface, and the joint area's space was virtually nil. Even the pain level was also very high to continue her daily activities.

**Type of prosthesis used:**(Information collected from surgical notes of the patient)VerySys Hip System, Taper Hip Prosthesis, Neck Taper, Plasma Sprayed, Press Fit, Standard Offset, Reduced neck length, bone screw Self-Tapping, Cementless Standard Offset. The cementless hip prosthesis was placed for a long life expectancy. It was developed specifically for young and active patients whose long life expectancy means that they are more likely than older patients to experience aseptic loosening with a conventional hip prosthesis.

**Immediate post-operative physiotherapy and instructions:**  
- as early as possible, the patient was advised to start exercise whenever she felt comfortable. This helps her avoid developing DVT, tightness in the knee ankle & hip joints, pain, muscle loss, bed soreness, etc. The following exercises were advised in the early post-operative stage

- Foot and ankle exercise (ankle pump),
- Active/assisted active range of motion exercise (ROM) of ankle, knee and hip joint,

- Isometric quadriceps exercise,
- Isometric back and abdominal exercises,
- Supported straight leg raising (SLR),
- Supported hip abduction,
- Full ROM exercises of upper limbs (Both),
- Supported standing 1<sup>st</sup> post-operative day (Walker supported),
- Mobilization with the help of walker only,
- Breathing exercises (use incentive spirometry),
- Same exercises for the normal leg also,
- Changes of position and care of skin after every two hours,
- Care of personal hygiene,
- High protein diet,

**Position of leg in the early stage:** Keep the operated limb in abduction and external rotation.

Keep two pillows in between the limbs. Keep the operated limb in this position as long as possible. Use a western toilet or high-lying chair.

#### Instruction during discharge and home management

- Independent ambulation with an assistive device or an assistant,
- Independent transfers may require assistance,
- Independent ADLs,
- Stair climbing under supervision,
- Appropriate home assistance (spouse, family, visiting nurses) for any activities,

#### Home modifications and precautions<sup>15</sup>

**Several home modifications were recommended to make it easier for her to do exercise without getting any injury:**

- Securely fastened safety bars or handrails in the shower or bath.
- Secure handrails along all stairways.
- A stable chair for early recovery with a firm seat cushion (allows knees to remain lower than hips), a firm back, and two arms.
- A raised toilet seat.
- A stable shower bench or chair for bathing.
- A long-handled sponge and shower hose.
- A dressing stick, a sock aid, and a long-handled shoehorn.
- A reacher allowing grasping of objects without excessive bending of your hips.
- Firm pillows for chairs, sofas, and cars enabling clients to sit with knees lower than hips.
- Removal of all loose carpets and electrical cords from the areas walked in the home.
- Avoid any quick movement, twisting & turning, extreme flexion & extension, and adduction of the hip joint.

**Home exercise program advised to the patient:** A scientifically designed exercise program is important to get good results in the post-operative stage. One should start it as

soon as possible. The following exercises were designed for her and started from the day 1 post-operative stage.

- Ankle Pumps (pic-1) -Begin this exercise immediately after surgery and continue until full recovery. She slowly pushes her foot up and down. Repeat this exercise several times, as often as every 5 or 10 minutes. She was advised to perform it while watching television or while sitting at home.



Picture-1

- Ankle rotations (fig-3) - Ask her to move her ankle inward toward the other foot and then outward away from the other foot. Repeat 5 times in each direction. Do the exercise 3 to 4 sessions a day.

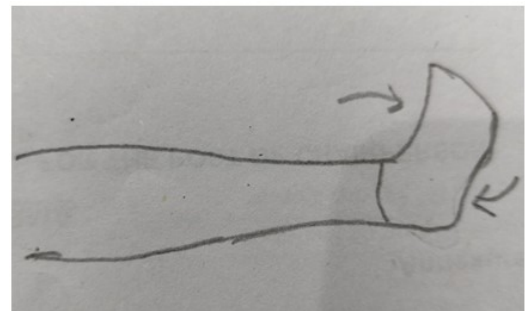


Figure-3

- Bed-supported knee bends and sliding of foot in the bed (fig-4). - Slide the foot toward her buttocks, bending the knee and keeping the heel on the bed. Do not let the knee roll inward. Hold the knee in a maximally bent position for 5 to 10 seconds. Straighten the leg. Repeat 10 times. Do 3 to 4 sessions a day.

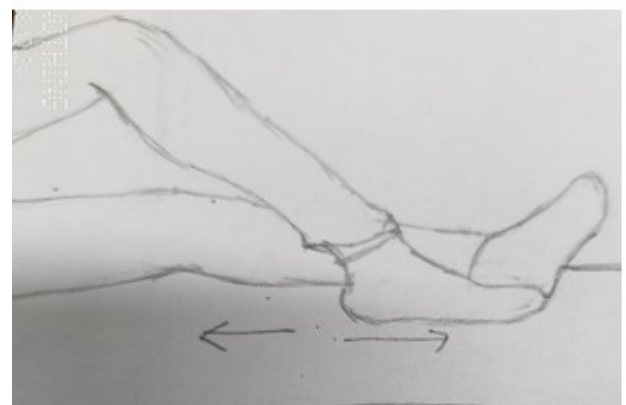


Figure-4

- Buttock (gluteal muscle) contractions - Tighten the buttock muscles and hold to a count of 5. Repeat 10 times. Do 3 to 4 sessions a day.

- Hip abductions (in lying position, pic-2) - Slide the leg out to the side as far as she can and then back. Repeat 10 times. This exercise should take 90 seconds. Do 3 to 4 sessions a day.



1) Lie on one side with shoulders, hips lined up straight and with bent knee backwards.  
2) Slowly lift the upper leg as high as comfortable (with knee straight) and hold it for a count of five and then relax.  
3) Do exercise for 10 times and twice daily.

Picture-2



Figure-6

- Quadriceps/Isometrics exercise (fig-5) - Tighten the thigh muscle. Try to straighten her knee. Hold for 5 to 10 seconds. Repeat this exercise several times a day.

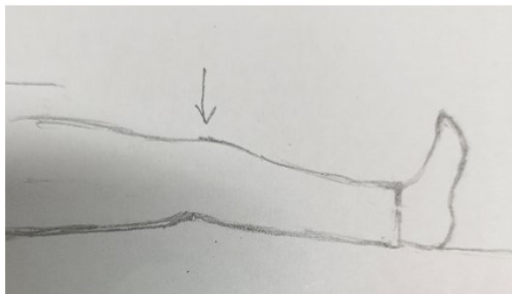


Figure-5

Straight Leg Raising (SLR, Pic-3) - Tighten your thigh muscle with your knee fully straightened on the bed. Lift your leg several inches. Hold for 5 to 10 seconds. Slowly lower your leg. Repeat until your thigh feels fatigued.



Picture-3

- Standing knee raises (supported). Lift your operated leg toward your chest (fig-6). Do not lift your knee higher than your waist. Hold for 2 or 3 counts. Put your leg down. Repeat 10 times. Do 3 to 4 sessions a day.

- Standing hip abduction (fig-7) - Be sure your hip, knee and foot are pointing straight forward. Keep your body straight. With your knee straight, lift your leg out to the side. Slowly lower your leg so your foot is back on the floor. Repeat 10 times. Do 3 to 4 sessions a day.



Figure-7

- Standing hip extension - Lift your operated leg backward slowly (fig-8). Try to keep your back straight. Hold for 2 or 3 counts. Return your foot to the floor. Repeat 10 times. Do 3 to 4 sessions a day.



Figure-8

- Active range of motion (ROM) exercise in standing and lying positions.
- **Long arc quadriceps:** Sit on a sturdy/stable chair (fig-9) or the side of the bed. Straighten the knees one by one. Hold it for 5-10 seconds. Slowly lower the leg down and relax.

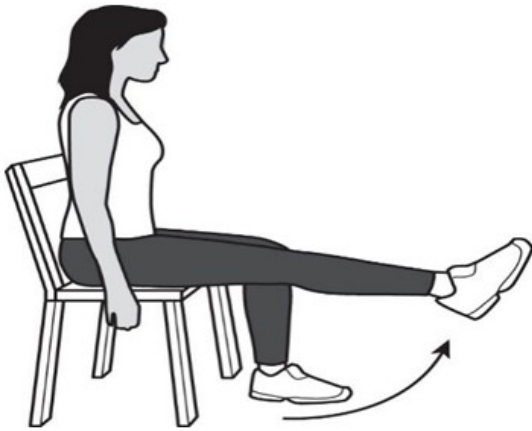
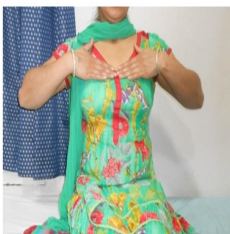


Figure-9

**Early activities:** A graduated walking program, i.e., initially inside the home and later on outside, slowly increasing mobility in the surrounding area. Walk as rhythmically and smoothly as you can. Do not hurry, adjust the length of the step and speed as necessary to walk with an even pattern. As the muscle strength and endurance improve, she may spend more time walking, and gradually put more weight on the leg. When she can walk and stand for more than 10 minutes and her leg, she can begin using a single crutch or cane. Advised her to hold the aid in the hand opposite the side of the operated hip.

- Resuming other normal household activities, including sitting, standing, climbing stairs, and activities in daily life (ADL).
- Specific exercises several times daily to restore movement and strength of muscle in the hip area. Patients can perform the exercises without help, but patients should have a physical therapist who will help them at home or in a therapy center during the first few weeks after surgery.



Sit straight and comfortably (as shown in the picture)  
Keep hands on the mid chest.  
Take air in slowly through nose for longer duration and breathe out through mouth.  
Do the exercise for 10-15 repetitions.

Picture-4

**Breathing Exercise:** She has to do breathing exercises as per the instruction of the physiotherapist and as shown in picture-4 and also with the help of incentive spirometry. This has to be done since post-operative day and continued at least for the next 3 months. After 3 months, as the patient got stronger and could put more weight on her leg, she was advised to keep up with her daily activities. This time she required less help than before with doing some basic chores and self-care for her

needs. She continued with physical therapy by going to regular appointments as advised. Walking at this point is especially important for recovery and to enhance fitness. She continued to walk regularly and at the same time, she was advised to avoid sitting for too long duration. At the same time, she was guided about the appropriate protocol for the body, including how often to do specific exercises and stretching. After 3 months, the patient was advised to fully resume her daily activities, including low-impact sports-like activities and a few physical therapy exercises like gentle range of motion exercises and light walking regularly. This ensures to improve her:

- Strength
- Balance
- Flexibility
- Joint Motion

#### Advanced exercises and activities

Exercise with the help of therabands, tubes, static bicycles, treadmills, etc, and of course under the guidance of a specialist i.e. Physiotherapist. All these exercises help to strengthen and improve the flexibility of limbs and general fitness. All the above-mentioned exercises are advised gradually as per the improvement and tolerance of the patient.

## RESULTS

Positive results and improvement trends started from the early post-operative stage. She followed the instructions of the exercise schedule sincerely and regularly from the beginning. After 1 month of follow-up, it was found that the patient was better and strictly maintained all the advice at home. She started the different sets of treatments along with a few more high-end exercises for increasing physical fitness regarding strength, flexibility, and pain reduction. This set of physiotherapeutic treatments was continued every three months for the next one and a half years. The patient strictly followed all the advice as per the instruction of the physiotherapist. Physically and mentally, the patient gradually improved and started living a normal life. There was an excellent improvement in comparison to the pretreatment stage. She continued doing the exercise and other home management later on as per the advice of the physiotherapist.

## DISCUSSION

Hip conditions that lead to the consideration of hip replacement surgery are often the same conditions that can affect many aspects of a patient's life including, professional, social, and personal including the ability to participate in sexual activity, which can cause pain and make certain movements difficult. So, the patient may have many questions regarding their personal and professional life<sup>16</sup>. After a patient and surgeon have decided to pursue hip replacement, which is important for future quality of life, the surgery must be carried out<sup>17</sup>. The outcome of the surgery and safety very much depends on the quality of management and patients self-care interest. The personal life very much depends on the mutual understanding of both partners in respect of sexual life, where hip movement is very important<sup>18,19,20,2</sup>. Both partners should be prepared to stop, adjust, and communicate about

the situation. Remember that the patient may experience pain and stiffness after surgery, affecting many aspects of life. So, working to stay as mobile as possible will help with managing the pain and stiffness. Therefore, completing the physical therapy home exercise program multiple times throughout the day is very important. Exercises that focus on weight-bearing and proper body mechanics and posture are beneficial, particularly for older adults who are at a greater risk for falls. THA is one of the most reliable, reproducible, successful, and cost-effective procedures for patients and orthopedic surgeons. The procedure requires care coordination across various healthcare provider groups, including nurses, physical therapists, advanced practitioners and physician extenders, medical physicians, and orthopedic surgeons.

## CONCLUSION

Recovery and healing are gradual, and there is no standard recovery timeline. So, the patient is advised to listen to the body and proceed with whatever makes them feel safe and comfortable. The study shows that patients must follow exercise programs and precautions to maintain long-term fitness levels<sup>22, 23</sup>. The same patient followed it very sincerely. The follow-up was continued every six months for the next 5 years. It was found that she maintained her fitness level later on very well. It was also found that the patient is doing very well concerning normal daily life even after 7 years of surgery. Occasionally she has low back pain for which she takes hot water fomentation and sometimes low dose pain killer which gives her very good relief from pain. A multidisciplinary team including the surgeon, nurse practitioner, and physiotherapist should work together to educate the patient and family on the procedure, expected issues, and guidance for aftercare. So, it is concluded that the successful outcome depends not only on good surgery but also on good physiotherapeutic advice and adherence to physiotherapy management for a longer duration.

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